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A. W. Anderson, Editor

J. Pileggi, Associate Editor H. M. Bearse, Assistant Editor

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CONTENTS

COVER: Gill-netting for shad in the lower part of the Hudson River, N. Y. The shad appear at the mouth of the Hudson River during the latter part of March and the run continues into May, but the peak catches usually occur between April 15 and the first week in May.

	Page		Page
Iron Sulfide Discoloration of Tuna Cans, No. 6 - Experiments to Elucidate Mechanism of the Reaction, by George M. Pigott and M. E. Stansby	1	TRENDS AND DEVELOPMENTS (Contd.):	
An Experimental Air-Pressure Depth-Meter for Use with Midwater Trawls, by Keith A. Smith	6	U. S. Foreign Trade:	
RESEARCH IN SERVICE LABORATORIES:	11	Edible Fishery Products, December 1956	27
Feeding Study with Menhaden Press Cake, by Hugo W. Nilson and Donald S. Snyder	11	Groundfish Fillet Imports Lower in February 1957	27
Cause of King Crab Meat Spoilage Indicated	12	Imports and Exports of Selected Fishery Products, January 1957	28
Oil Content of Fish Varies	12	Imports of Canned Tuna in Brine Under Quota Proviso	28
TRENDS AND DEVELOPMENTS:	14	United States Fish Oil Exports Decline in 1956	29
California:		Wholesale Prices, February 1957	30
Shrimp Fishery Makes Steady Growth	14	FOREIGN:	32
Cans--Shipments for Fishery Products, 1956	14	International:	
Federal Purchases of Fishery Products	15	International North Pacific Fisheries Commission:	
Films	15	Meeting Held in Tokyo, March 1957	32
Fisheries Loan Fund:		North Sea Fishing Convention:	
Loan Applications Total \$6.3 Million	16	Swedish Association Comments on	32
Fish Flour--A Weapon Against Protein Malnutrition Florida:		North Pacific Fur Seal Commission:	
Red Tide Research in Gulf of Mexico	17	Fur Seal Conservation Convention Signed	33
Maine:		Trade Agreements:	
Governor Proclaims April 11 as Sardine Day ...	18	Australia and Japan Sign Trade Agreement which Includes Canned Fish	38
Maine Sardines:		United Nations:	
Included in National Scout Jamboree Menu	19	Experts Meet to Prepare for Conference on Law of the Sea	38
Market Outlook for Fishery Products	19	Argentina Republic:	
North Atlantic Fisheries Exploration and Gear Research:		Whaling Firm Ceases Operations	39
Midwater Trawl Gear Tests in Block Island Sound Area (M/V Delaware Cruise 57-2)	19	Austria:	
Pacific Coast Fishing Ports, by F. Bruce Sanford ..	20	Canned Mackerel Market	39
Pacific Oceanic Fishery Investigations:		Bolivia:	
Summer Tuna Fishery and Bait Potentialities of Marquesas and Tuamotu Islands	23	Canned Mackerel Market	40
Deep-Swimming Yellowfin Tuna Sampled by Long-Lining in Marquesas Area (M/V John R. Manning Cruise 34)	24	Brazil:	
Sport Fishing and Hunting License Holders Highest on Record	25	Tuna Landed by Japanese Fishing Vessel	40
United States Fishing Fleet Additions	26	Canada:	
		The Fishing Industry's Future	41
		Great Slave Lake Fishery	41

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IRON SULFIDE DISCOLORATION OF TUNA CANS^{1/}

No. 6 - Experiments to Elucidate Mechanism of the Reaction

By George M. Pigott* and M. E. Stansby**

ABSTRACT

Experiments which were conducted to elucidate and render inoperative the mechanism whereby tuna cans are discolored by iron sulfide formation were partially successful. The catalytic factor was found to be heat-stable and present in the meat of certain batches of tuna. Repacking of the tuna from discolored cans into new cans with a second retorting did not prevent discoloration. Neither oil nor brine from such cans, when repacked, caused discoloration. Headspace gases did not show any significant differences between control and discolored packs. Acids were found not to be the cause of the discoloration though they did cause corrosion of the cans. Inversion of the cans soon after retorting prevented the formation of iron sulfide. Discoloration does not occur in cans containing no free liquid.

BACKGROUND

Certain batches of tuna fish, when canned, cause an iron sulfide discoloration in the can area adjacent to the headspace. The present investigation has been a study of iron sulfide formation and the variables that affect it (Pigott and Stansby 1955).

The five preceding papers in this series of articles designed to report the work of the project have dealt with the effect of processing variables on can discoloration. The objective of this paper, the last in the series, is to discuss various experiments that were carried out to elucidate the mechanism of the reaction causing the iron sulfide discoloration.

EXPERIMENTAL WORK

GENERAL: Previous work in this investigation has shown that the iron sulfide discoloration is formed from hydrogen sulfide that is produced by tuna meat during retorting, and iron in the tin can that has been converted to the ferrous state. The solution to the problem now lies in determining the mechanism whereby iron is converted to the ferrous form by a substance present only in certain batches of tuna. A series of experiments were carried out to study the mechanism of this reaction.

REPACKING CANNED TUNA: A repacking experiment was undertaken in an effort to determine if the factor causing discoloration was in the meat or in the liquid. The experiment was as follows: After cans of discolored and normal tuna were opened, the oil was drained, and the meat was repacked into new single-enamel cans. The drained oil from both the discolored and the normal packs was added to a freshly precooked albacore pack that had never caused can discoloration. Results of this work are shown in table 1.

* Formerly Chemical Engineer, Continental Can Company, Seattle, Wash.

** Chief, Pacific Coast and Alaska Technological Research, Fishery Technological Laboratory, Branch of Commercial Fisheries, U. S. Fish and Wildlife Service, Seattle, Wash.

^{1/} This investigation, which was carried out at the Seattle Technological Laboratory, U. S. Fish and Wildlife Service, was jointly sponsored by the Continental Can Company and the U. S. Fish and Wildlife Service.

Table 1 - Effect of Repacking and Reprocessing Tuna Upon Can Discoloration

Species of Tuna	Original Pack ^{1/}		First Repack of Original Fish ^{1/}		Second Repack of Original Fish ^{1/}	
	Additive	Degree of Discoloration	Additive	Degree of Discoloration	Additive	Degree of Discoloration
Yellowfin	Oil, salt	Medium	Soya oil	Medium	Soya oil	Light
	Oil, salt	Medium	Brine	Medium	Brine	Light
Albacore	Oil, salt	None	Soya oil	None	Soya oil	None ^{2/}
	Brine	None	Soya oil	None	Soya oil	None ^{2/}
	Brine	Medium	Brine	Medium	Brine	Light
	Oil, salt	Medium	Soya oil	Medium	Soya oil	None ^{3/}
	Oil, salt	None	Soya oil from discolored pack	None	Soya oil from discolored pack	None
	Oil, salt (flake pack)	None	Soya oil	None	-	-

^{1/}SOLID PACK UNLESS OTHERWISE STATED.

^{2/}THIS PACK SHOWED MEDIUM DISCOLORATION WHEN THE SECOND REPACK WAS INCUBATED AT 37° C. FOR 14 DAYS.

^{3/}THIS PACK SHOWED LIGHT DISCOLORATION WHEN SECOND REPACK WAS INCUBATED AT 37° C. FOR 14 DAYS.

The tuna that caused discoloration in the original packs again caused discoloration when repacked into a new can. The oil that was drained from the original discolored packs did not cause discoloration in the albacore packs. Brine packs gave the same results, when repacked, as did oil packs. Thus, the factor favoring discoloration seems to be present in the tuna meat, since the factor causing can discoloration is carried by the previously processed tuna meat into a new can even when the oil or brine from the preceding stage is removed and fresh oil or brine is added.

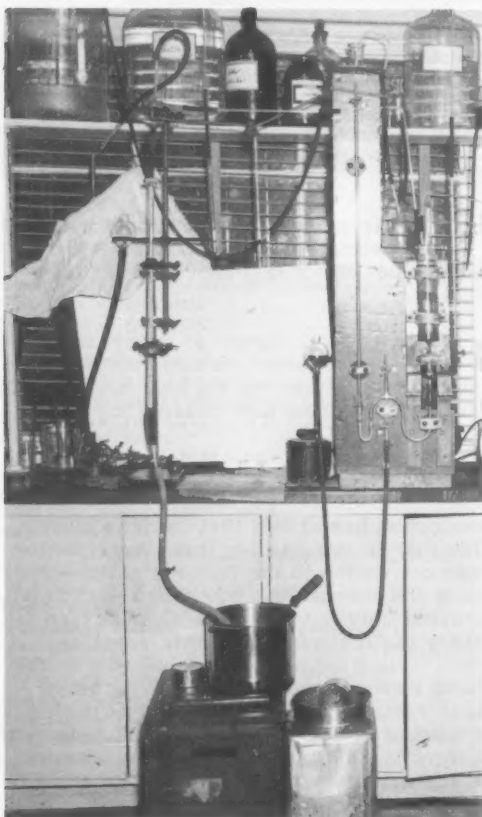


Fig. 1 - Apparatus used in determination of quantity and chemical composition of head-space gases in canned tuna.

COMPOSITION OF HEADSPACE GASES:

Headspace gases in various experimental and commercial solid packs of tuna were analyzed for volatile acids, volatile bases, oxygen, and hydrogen to see if a difference in composition between normal and discolored packs could be detected (table 2). In general, no significant differences were detected between the various packs. The variation in composition for the constituents measured was just as great in cans from the same pack as it was between different packs, normal or discolored.

EFFECT OF pH: With the exception of one discolored commercial albacore pack that had a pH of 5.6, all of the packs inspected in this investigation ranged from a pH of 5.85 to 6.1. The acid content of experimental packs was varied to determine the effect of pH of the meat on can discoloration. Both acetic and hydrochloric acids were used to adjust the pH of the can contents just before sealing and retorting.

At pH values of 5 or above no can discoloration was produced in experimen-

tal packs of albacore that normally did not cause can discoloration. When the pH was adjusted below 5, the cans were attacked, but the corrosion was not of the same type as that found in cans discolored under normal processing conditions. Furthermore, owing to the buffering capacity of the tuna meat, such a large amount of acid had to be added that the meat became inedible.

EFFECT OF FREE LIQUID:

Discoloration reported in commercial packs occurs in solid-pack tuna but not in flake packs. The two main differences between solid packs and flake packs are the particle size and the amount of free liquid that is in the can. The flake pack absorbs much more oil than does the solid pack so that commercially-canned flake tuna has no free oil in the can. The effect of having free oil or brine in flake packs was thoroughly investigated using albacore and yellowfin tuna that normally cause can discoloration in solid packs.

It was found that normal flake packs will not cause can discoloration when the amount of oil that is normally used is present. However, if enough excess oil is added so that free oil is present in the can, the same amount of discoloration is found in flake packs from lots of tuna causing discoloration as is found in solid packs from the same lots of tuna. The presence of free brine in brine flake packs from the same lots of tuna also produced sulfide discoloration. A slight amount of can discoloration was found in some flake packs not containing free liquid when canned. This was due to free liquid being cooked from the brine packs during retorting. Thus, these results indicate that there is a substance in some tuna that will cause can discoloration if a medium such as oil or brine is free to wash over the can surface during retorting. Results of this work are shown in table 3. In these experiments it was again found that salt must be present if discoloration is to take place.

Type of Pack ^{2/}	Additives			Discoloration
	Soya Oil	Saturated Brine (Ounces)	Salt	
Solid	1 1/2	0	0	Degree Medium
	1 1/2	0	0	None
Flake	1 1/2	0	0	None
	3 3/4	0	0	Medium
Solid	0	1 1/2	0	Heavy
	0	0	0	None 1/2
Flake	0	1 1/2	0	None 1/2
	0	3 3/4	0	Medium

^{1/}THESE PACKS WERE MADE FROM LOTS OF TUNA THAT HAD A RECORD OF CAUSING CAN DISCOLORATION.
^{2/}ALL PACKS WERE PROCESSED 75 MINUTES AT 240° F.
^{3/}APPROXIMATELY 3 OUNCES OF OIL OR BRINE WERE ADDED TO THESE PACKS TO INSURE COMPLETE COVERAGE OF THE MEAT. THEREFORE, FREE LIQUID WAS PRESENT IN THE CAN.
^{4/}IF THE PRECOOKED FISH WAS MOIST ENOUGH SO THAT FREE LIQUID WAS COOKED OUT OF THE FISH DURING RETORTING, CAN DISCOLORATION WAS FOUND.

skins and then canned and processed, can discoloration was prevented.

INVERTING CANS AFTER RETORTING: Iron sulfide discoloration never occurs where meat or liquid is in contact with the can during the cooling period after retorting. Tin sulfide frequently forms in this area in both normal and discolored packs. Since cans that will be discolored apparently have ferrous iron being formed in the headspace during the cooling period, it seemed that ferrous sulfide might be prevented if the cans were inverted during cooling, just before the deposit occurred. At this time, enough of the liquid might adhere to the bottom, so that when the can was inverted, stannous ions would continue to form in the new headspace. Also, the original top end would be covered with the liquid that prevents ferrous ions from being formed.

Table 2 - Composition of Headspace Gases in Solid-Pack Tuna

Constituent	Volume of Gas ^{2/}	
	Range	Average
	(Cubic Centimeters)	
Total headspace gas ^{1/}	6.75-27.5	15.0
Volatile acid	0.23- 2.28	0.72
Volatile base	0.23- 1.42	0.72
Oxygen	0- 0.45	0.18
Hydrogen	3/	0

^{1/}THE INERT GAS (MOSTLY NITROGEN) DETERMINED BY DIFFERENCE WAS 80 TO 95 PER-CENT BY VOLUME.

^{2/}70° F., ATMOSPHERIC PRESSURE.

^{3/}FOUND IN MINUTE QUANTITIES IN FOUR CANS ONLY.

These results were followed by experiments to determine whether or not can discoloration would occur if the free liquid were kept from contacting the surface of the lid during retorting. When the tuna and liquid that ordinarily caused discoloration were placed in sausage

Packs of yellowfin and albacore that ordinarily produce can discoloration were retorted for 75 minutes at 240° F. Cans from the packs were then inverted at intervals from 0 to 60 minutes after retorting. Cans that were inverted between 5 and 20 minutes after retorting showed no discoloration on the top or bottom, whereas the tops of control cans (not inverted) were discolored. After the cooling period, the cans could be turned right-side up for labeling and handling.

In a very few tuna canneries, the cans are placed in orderly fashion on trays and retorted. The cans on these trays could readily be inverted after removal from the retort. However, in the vast majority of tuna canneries, the cans are placed in baskets in a jumbled fashion, with most cans standing on edge. In such plants it would be quite impossible to invert cans after they are retorted as a method of preventing can discoloration.

CONCLUSIONS

1. The factor that caused can discoloration was relatively heat stable and was present in the meat of certain batches of tuna.
2. No significant differences in the gross headspace gas composition of normal and discolored tuna were detected.
3. The pH of the tuna was not found to be an important factor in determining the extent of can discoloration.
4. Discoloration did not occur in canned tuna unless free liquid (oil or brine) was present in the can. This accounts for the fact that flake packs, which absorb the amount of oil normally added commercially, do not show can discoloration.
5. Discoloration did not occur where meat or liquid was in contact with the can during cooling.

RECAPITULATION OF ENTIRE INVESTIGATION

The object of this entire investigation was to study the reaction mechanism whereby iron sulfide is formed during the canning of some batches of tuna. Of course, the ultimate aim of any such project is to supply information that will lead to a commercially-feasible solution of the problem. The most important conclusions that have been reached during this investigation and reported in this series of papers are as follows:

1. Formation of black iron sulfide in canned tuna depends upon the presence of ferrous iron.
2. All cans of tuna contain sufficient hydrogen sulfide to give can discoloration if any exposed iron in the can is in the ferrous state.
3. Sulfide discoloration occurs only in cans that have free liquid in the can.
4. Sulfide discoloration occurs after the cans are retorted, during the cooling period.
5. Increasing the length of time the fish are in cold storage prior to canning increases the tendency for tuna to cause can discoloration.
6. Sulfide discoloration is much worse in cans of tuna that are allowed to remain at elevated temperatures after the retorting period.
7. The factor that causes iron in the can to be converted to the ferrous state in certain batches of canned tuna is present in the meat of the fish.

Currently, the senior author is undertaking an investigation^{2/} of the tin-iron couple in tuna cans during processing and cooling. It is hoped that the factor that causes ferrous ions to be present in the can area adjacent to the headspace in certain batches of tuna can be found by this approach. If this factor can be defined, a long step will have been taken toward the control of iron sulfide discoloration of tuna cans.

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^{2/} This investigation is being carried out in the Department of Chemical Engineering, University of Washington, Seattle, Wash., as the basis for a Ph. D. thesis.



TUNA FOR BREAKFAST

"Eat a Better Breakfast"--the slogan of National Better Breakfast Month in September--was intended to point up the need for improving breakfast eating habits.

Various government, medical, and nutritional leaders have stated that from many standpoints breakfast is the most important meal of the day. Yet, in many households it is the "neglected meal."

Surveys show that a consistent feeling of well-being is maintained after eating a high-protein breakfast. This maintains the proper blood sugar level and increases the physical and mental efficiency of the young and old alike.

Canned tuna with its high-quality protein is a natural ingredient for a breakfast "delight" made by combining tuna with scrambled eggs. Served with a fruit, toast, and a beverage, you have a perfect start for a busy day.

Join the bandwagon for a better breakfast by serving "Tuna and Egg Scramble" as recommended by the home economists of the U. S. Fish and Wildlife Service.

TUNA AND EGG SCRAMBLE

1 CAN (6 OR 7 OUNCES) TUNA
 $\frac{1}{2}$ CUP CHOPPED ONION
 3 TABLESPOONS BUTTER OR OTHER
 FAT, MELTED
 7 EGGS, BEATEN
 $\frac{1}{3}$ CUP MILK

1 TABLESPOON LEMON JUICE
 1 TEASPOON WORCESTERSHIRE SAUCE
 $\frac{1}{2}$ TEASPOON SALT
 DASH CAYENNE PEPPER
 CHOPPED PARSLEY
 TOAST POINTS

Drain tuna. Flake. Cook onion in butter until tender. Combine eggs, milk, lemon juice, seasonings, and tuna. Add to onion mixture and cook until eggs are firm, stirring occasionally. Garnish with parsley sprinkled over the top. Serve on toast points. Serves 6.

AN EXPERIMENTAL AIR-PRESSURE DEPTH-METER FOR USE WITH MIDWATER TRAWLS

By Keith A. Smith*

While conducting experimental midwater trawling for herring in the Gulf of Maine during the spring and summer of 1956, an experimental air-pressure depth-meter was developed by the Service's Maine Herring Exploratory Fishing and Gear Research Station at Boothbay Harbor, Maine. This instrument was specifically designed to meet the program's need for a shallow-water net depth indicator. Compared

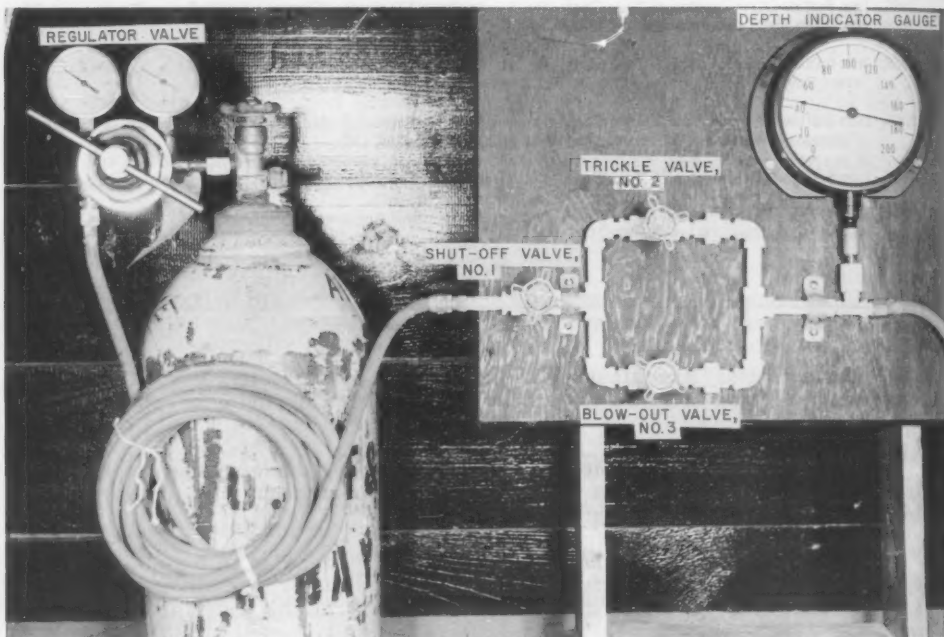


FIG. 1 - AIR SUPPLY, REGULATOR GAUGE, CONTROL VALVES AND DEPTH-PRESSURE INDICATOR GAUGE ASSEMBLED TO INDICATE DEPTH.

to existing electronic devices for this purpose, it is simple and inexpensive to construct. The method of operation involves towing one end of an air-pressure tube at the same depth as the net. When used for the deeper tows the tube is cumbersome, but it is expected that this device will fill a transient need until a simple electronic depth meter can be developed.

Necessity for a depth-meter became apparent during the early midwater trawl tests and fishing trials, because fishing success depends upon knowledge of the exact fishing depth of the net. A midwater trawl is towed neither at the surface of the water nor on the sea's bottom but somewhere between these two extremes, and it is not possible to know by direct observation through what stratum of water the trawl is moving. Measurement of depression angles of the towing warp gives an approximate net depth, but when great lengths of towing warp are out and thin schools of fish are detected, this method of determining depth is not sufficiently accurate.

* FISHERY METHODS AND EQUIPMENT SPECIALIST, EXPLORATORY FISHING AND GEAR DEVELOPMENT SECTION, BRANCH OF COMMERCIAL FISHERIES, U. S. FISH AND WILDLIFE SERVICE, BOOTHBAY HARBOR, ME.

To meet the practical need for midwater trawling, an experimental depth-meter was built that would meet the following conditions:

1. It must be dependable and accurate within narrow limits.
2. The design and operation of the instrument must be simple and easy to understand.
3. Construction of all components of the equipment must be rugged and resistant to breakage to insure trouble-free operation.
4. The complete unit should be of low cost and made of materials readily available.

It is known that the pressure in a body of water varies directly with the increase in depth. Determination of the pressure at any certain point in an open body of sea

water of a given density is tantamount to knowing the depth at that point. This direct proportion seemed to offer the best basis for an indicator of the depth of a trawl in mid-water.

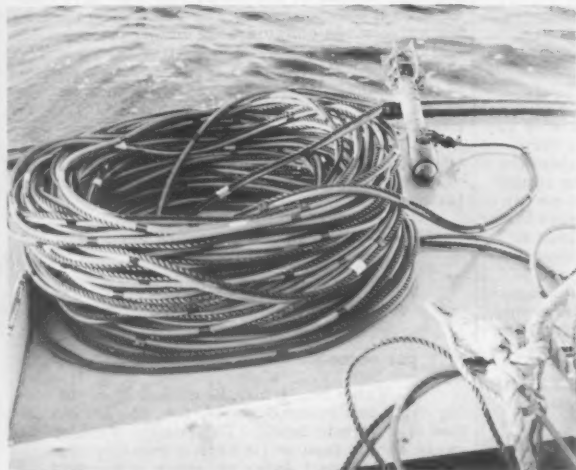


FIG. 2 - 100 FATHOMS OF PRESSURE HOSE. IN ORDER TO SUPPORT THE PRESSURE HOSE WITHOUT CONSTRICTING IT, A 3" DIAMETER NYLON ROPE WAS FASTENED TO THE HOSE WITH PLASTIC ELECTRICAL TAPE AT SPACES OF APPROXIMATELY 18 INCHES. THE BATHY-THERMOGRAPH WAS USED FOR CHECKING DEPTH READINGS.

from entering the tube. It was decided that the best method of insuring that such a tube remained clear of water would be to add air continuously at the top of the tube, forcing a small amount of air out of the tube at the open bottom end.

This method of determining depth seemed to offer the best solution to the problem encountered. After several preliminary tests, the following gear components were assembled:

1. A source of compressed air. (A standard compressed air cylinder containing 300 cubic feet of air at a maximum pressure of approximately 2,000 pounds per square inch (p.s.i.) was used. A regulator valve was added to give a reduced and constant pressure.)
2. A group of three needle valves to control the flow of air into the pressure tube.

3. A simple air pressure gauge. (The gauge originally used was calibrated in five p.s.i. steps, but it was found that a more sensitive gauge with finer graduations was needed. For best results, the gauge should be graduated in steps no greater than two p.s.i.)
4. 100 fathoms of $\frac{3}{16}$ " inside diameter reinforced rubber hose designed for a maximum working pressure of 300 p.s.i.
5. 100 fathoms of $\frac{3}{8}$ " diameter rope to support the hose.

This gear was assembled as shown in figures 1 and 2.

The gear is operated in the following sequence:

1. All valves are closed at the start.
2. The air tank valve is opened and the pressure regulator valve set to deliver air at 200 p.s.i. pressure.
3. The open end of the hose is put into a bucket of water. Valve No. 1 (fig. 1) is opened wide and Valve No. 2 is opened very slightly until a very thin stream of air bubbles comes out the open end of the hose. The opening of Valve No. 2 is adjusted carefully at this point so that although some air is flowing through the hose, the back pressure showing on the depth-indicator gauge is very close to zero. The pressure reading obtained at this point is due to air friction within the tube and must be subtracted from the reading later when the gauge is indicating depth. After the setting of Valve No. 2 is made it should not be disturbed throughout the tow.
4. The open end of the hose is attached to the midwater trawl or other object on which depth data is desired and then lowered into the water. As the open end of the hose is lowered, air pressure builds up until it approximately equals the water pressure at the hose opening. This pressure will show on the indicator gauge and will not be exceeded because the open end will allow any excess air to exhaust out into the water.
5. When the net has been lowered to the approximate working depth, Valve No. 3 is opened momentarily allowing a strong flow of air to bypass Valve No. 2. The purpose of this is to blow an excess of air through the hose to insure that

the hose is free of any water that may have entered it as it was lowered. The reading on the indicator valve rises considerably during the operation and does not indicate depth. After the hose is "blown out," Valve No. 3 is closed and the pointer of the depth-indicator gauge settles back and stops at the value of water pressure at the end of the hose, plus the very small reading obtained in step 3 which should be subtracted to obtain the actual water pressure. The pressure thus obtained, divided by 2.66 gives the depth at the hose end in fathoms.

$0.43 = \text{lbs./sq. in. pressure per foot depth of pure water}$

$1.025 = \text{density standard sea water}$

$6 \text{ ft.} = 1 \text{ fathom}$

$(0.433 (1.025) (6)) = 2.66 \text{ pounds of pressure per square inch per fathom depth.}$

6. Valve No. 1 may be closed after the towing depth has become stable, i.e. the net has settled at a certain depth. The pointer of the indicator gauge should then settle back a pound or two and indicate the exact water pressure at the open end of the hose since no air is moving and air friction inside the hose is not involved. The initial reading in step 3 should be disregarded when taking this reading. After a reading is obtained, Valve No. 1 should be opened allowing a trickle of air to pass through Valve No. 2 again into the hose to insure that no water enters the hose should the net sink deeper. Valve No. 2 should not be disturbed after the initial setting is made in step 3.

Two types of tests have been made on this equipment. They are (1) vertical lowerings on a measured line, and (2) towing tests, using a 0-200' bathythermograph as a testing standard.

Results of the first type of test are shown in tables 2 and 3. Note that a positive error is shown in each test. These errors are apparently due to air friction inside the hose caused by the flow of air. The error was greater in test 1, probably due to the trickle valve being opened slightly more in this test. It was not possible to evaluate this error at the start of the tests because the gauge used shows no reading until a pressure of five p.s.i. is reached. Since these tests were made, a larger more finely calibrated gauge has been employed (fig. 1) and has been found to operate more satisfactorily.

Table 1 - Pressure in Pounds Per Square Inch (Considering Surface 000; 1 Atmosphere = 14.7)

Depth	Pressure	Depth	Pressure
Fathoms	Lbs./Sq. Inch	Fathoms	Lbs./Sq. Inch
1	2.7	26	69.2
2	5.3	27	71.9
3	8.0	28	74.6
4	10.7	29	77.2
5	13.3	30	79.9
6	16.0	31	82.6
7	18.6	32	85.2
8	21.3	33	87.9
9	24.0	34	90.5
10	26.6	35	93.2
11	29.3	36	95.9
12	32.0	37	98.5
13	34.6	38	101.2
14	37.3	39	103.9
15	40.0	40	106.5
16	42.6	41	109.2
17	45.3	42	111.8
18	47.9	43	114.5
19	50.6	44	117.2
20	53.3	45	119.8
21	55.9	46	122.5
22	58.6	47	125.2
23	61.2	48	127.8
24	63.9	49	130.5
25	66.6	50	133.1

A towing test was made to check the accuracy of the device while moving through the water. In this test, a towline and the pressure hose along with its supporting line were let out 100 fathoms to a skiff that was towed behind the testing vessel. The open end of the pressure hose with a bathythermograph and depressor attached were lowered from the skiff on a $\frac{5}{8}$ " wire rope to various depths while the skiff was being towed. Results of this test are tabulated in table 4. Note that a positive error also resulted in this test. Since this error is consistently present and always positive, two pounds pressure representing approximately $\frac{3}{4}$ fathom should be subtracted from the gauge reading. The reading thus obtained in all tests is accurate within less than one fathom.

The above-described equipment might find practical application where underwater fishing or sampling devices are used on which depth data is required. Within close limits,

Table 2 - Depth-Indicator Test (Vertical suspension test starting at 2 fathoms and lowering to 29 fathoms)

Line Out	Pressure	Pressure Depth Indicated	Error
Fathoms	Lbs./Sq. Inch	..... (Fathoms)	.....
1	-	-	-
2	8.0	3.0	+1.0
3	11.5	4.3	+1.3
4	14.5	5.5	+1.5
5	17.0	6.4	+1.4
6	19.5	7.3	+1.3
7	22.0	8.3	+1.3
8	24.5	9.2	+1.2
9	27.0	10.1	+1.1
10	29.5	11.1	+1.1
11	32.0	12.0	+1.0
12	35.5	13.3	+1.3
13	38.0	14.3	+1.3
14	41.0	15.4	+1.4
15	44.0	16.5	+1.5
16	46.5	17.5	+1.5
17	49.0	18.4	+1.4
18	51.0	19.2	+1.2
19	54.0	20.3	+1.3
20	56.5	21.2	+1.2
21	59.0	22.2	+1.2
22	61.5	23.1	+1.1
23	64.0	24.1	+1.1
24	67.0	25.2	+1.2
25	70.0	26.3	+1.3
26	73.0	27.4	+1.4
27	75.5	28.4	+1.4
28	78.0	29.3	+1.3
29	80.5	30.2	+1.2
30	-	-	-

Average error = +1.27 fathom

Table 3 - Depth-Indicator Test (Vertical suspension test starting at 33 fathoms and raising)

Line Out	Pressure	Pressure Depth Indicated	Error
Fathoms	Lbs./Sq. Inch	..... (Fathoms)	.....
33	90	33.8	+0.8
32	88	33.0	+1.0
31	85	31.9	+0.9
30	82	30.8	+0.8
29	79	29.7	+0.7
28	77	28.9	+0.9
27	75	28.2	+1.2
26	73	27.4	+1.4
25	70	26.3	+1.3
24	68	25.6	+1.6
23	65	24.4	+1.4
22	62	23.3	+1.3
21	59	22.1	+1.1
20	55	20.7	+0.7
19	51	20.2	+0.2
18	49	18.4	+0.4
17	46	17.3	+0.3
16	44	16.5	+0.5
15	41	15.4	+0.4
14	38	14.3	+0.3
13	35	13.2	+0.2
12	33	12.4	+0.4
11	30	11.3	+0.3
10	27	10.2	+0.2
9	24	9.0	+0.0
8	22	8.3	+0.3
7	19	7.1	+0.1
6	17	6.4	+0.4
5	14	5.4	+0.4
4	11	4.1	+0.1
3	8	3.0	+0.0
2	6	2.3	+0.3

Average error = +0.62

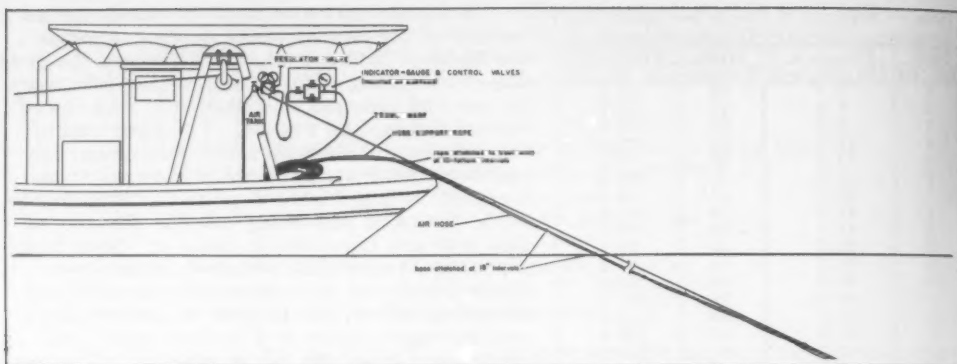


FIG. 3 - DIAGRAM OF DEPTH-INDICATOR AS USED WITH MIDWATER TRAWL.

Table 4 - Depth-Indicator Test
(Towing test using bathythermograph as standard depth-indicator)

BT Reading	Pressure	Pressure	Error
Fathoms	Lbs./Sq. Inch	Depth Indicated	
		..... (Fathoms)	.....
5.7	18	6.8	+1.1
10.7	31	11.6	+0.9
15.5	42	15.8	+0.3
20.2	56.5	20.8	+0.6
25.0	70	26.3	+1.3
30.0	82	30.8	+0.8

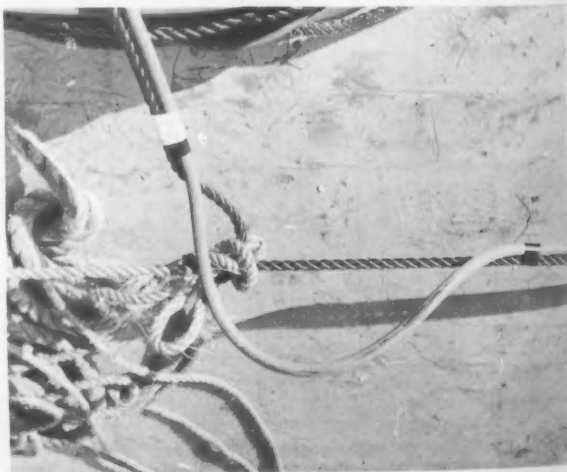
Average error = +0.8 fathoms

the depth indicator is accurate and dependable. It is of simple design, easy to operate, and trouble free. Compared to some other types of depth-telemetering equipment, the cost is low. The prices of the components of gear assembled are:

Air cylinder	\$ 60.00
Regulator valve	42.50
300 cubic feet of air	4.00
3/8 in. needle valves 3 @ \$2.26 ea. ..	6.78
Pressure gauge	6.38
100 fathoms 1 1/2 in. hose 300 p.s.i. cap. ..	82.61
100 fathoms 3/8 in. nylon rope	86.50
Total	\$235.77

FIG. 4 - A 3/8 IN. NYLON ROPE WAS USED TO SUPPORT THE PRESSURE HOSE. THIS PROVIDES A MEANS OF ATTACHING THE HOSE TO THE TRAWL WARP ALONG ITS ENTIRE LENGTH. ALTHOUGH CONSIDERABLE TENSION IS APPLIED TO THE ROPE, NO CONSTRICTION OR BINDING OF THE HOSE IS EFFECTED. A SUPPORT ROPE IS NECESSARY FOR PROPER OPERATION OF THIS GEAR.

This equipment is limited to a maximum depth of 113 fathoms by the pressure capacity of 300 p.s.i. of the hose used. When used with a 0 to 200 p.s.i. pressure gauge the maximum depth limitation is 75 fathoms. While these depths are sufficient for the specific use for which this equipment was designed, greater depth capacity may be attained by using a hose and gauge of greater pressure capacity.





RESEARCH

IN SERVICE LABORATORIES



FEEDING STUDY WITH MENHADEN PRESS CAKE

In order to obtain information on the nutritive value of menhaden press cake, five successive filial generations of albino rats have been fed (free-choice) menhaden press cake, fresh cabbage, and a high-calorie diet composed of starch, vegetable shortening, and cod-liver oil in the proportion of 80, 16, and 4 parts, by weight, respectively.

The results and the conclusions from the feeding study for the first four generations, as well as the preparation and composition of press cake, have previously been reported (Nilson and Snyder 1955). These results showed that all the litters that were raised grew satisfactorily without abnormal mortality and were generally very healthy. None of the rats died from mechanical obstruction by bones. Two male rats of the third generation had seizures apparently of nervous origin, but it was not known whether these were due to a deficiency of the diet or were of genetic origin. It was concluded that press cake seemed to be a satisfactory source of protein and possibly some vitamins for normal growth and reproduction. This is a report on the continuation and conclusion of the feeding study.

All the six first-generation rats, originally allotted to the experiment during September 1953, had died from natural causes by December 1955. The rats lived more than 2 years, which is a normal span of life for the breeding rats of the stock colony in the Service's College Park Fishery Technological Laboratory. At that time two cages containing mixed litters of fourth-generation rats, two males and two females in each cage, were kept for continuation of the experiment while the rest of the rats--second, third, and fourth generations--were sacrificed as surplus.

Two litters were born to these fourth-generation rats during February 1956, but both of these litters were found dead within 3 days following birth. Two litters were also born during March. The first was found dead the day following birth, and the second was lost when the mother died during parturition. A litter of four rats, three males and one female, was born during April. This fifth filial generation grew normally and was sleek and healthy looking. No more litters were born to the fourth generation rats during the remaining 9 months the experiment was continued.

Three litters of three rats each were born during August, September, and October 1956, to the fifth-generation rats. All litters were found dead within 3 days following their birth. In November, a litter of two was born, but these young were found dead within 2 days following their birth. No more litters were born to the fifth-generation rats, and on February 2, 1957, the feeding study was concluded.

The death of the young soon after birth and the reduced number of litters from the fourth-generation rats, as well as from the preceding generations, probably indicates that the diet did not supply sufficient amounts of accessory food factors needed by the rats for maximum breeding and maternal care. Some lack of maternal care is experienced with the breeding rats of the stock colony in the Laboratory, but the incidence is not as great as was noted with these experimental animals. No accessory food factors alone or feeds that contain large concentrations of these fac-

tors that could be responsible for this lack of maternal care and reduced number of litters were added to the press cake, cabbage, and high-calorie diet, so this might be expected. The diet must contain a limited supply of these factors, however, since some litters were successfully raised. Those litters that were raised in all cases grew normally and were healthy.

SUMMARY

Menhaden press cake, a high-calorie diet, and fresh cabbage have been fed free-choice to five successive filial generations of albino rats for nearly $3\frac{1}{2}$ years. No difficulty has been experienced due to palatability or the numerous bones in the press cake. The rats have been generally very healthy, with the exception of two male third-generation rats that apparently had nervous seizures of unknown origin. The press cake seems to be a satisfactory source of protein for growth and maintenance, and possibly a limited source of some accessory food factors for reproduction and maternal care.

--BY HUGO W. NILSON, CHEMIST,
DONALD S. SNYDER, BIOCHEMIST,
FISHERY TECHNOLOGICAL LABORATORY,
BRANCH OF COMMERCIAL FISHERIES,
U. S. FISH AND WILDLIFE SERVICE,
COLLEGE PARK, MD.

LITERATURE CITED

Nilson, Hugo W., and Snyder, Donald G.

1955. Feeding Studies with Menhaden Press Cake. *Commercial Fisheries Review*, vol. 17, no. 11, pp. 17-18 (also Separate No. 421).

Note: Acknowledgment is made for the assistance of Robert R. Kifer in so carefully taking care of the animals.



CAUSE OF KING CRAB MEAT SPOILAGE INDICATED

Studies on the protein and nonprotein nitrogen fractions as well as on the proximate composition of king crab meat, now under way at the Service's Fishery Products Laboratory, Ketchikan, Alaska, have yielded information that may be directly related to the short iced storage life and to the comparatively high rate of spoilage of this product. Confirmatory experimentation is being conducted.

Samples of raw frozen king crab have been separated into their component physical parts, and the meat in these parts has been subjected to proximate analyses. In addition, preliminary studies have been carried out in an attempt to partition the total nitrogen of king crab meat into its various protein and nonprotein fractions. It was observed that in king crab meat, the nonprotein nitrogen fraction was more abundant than in any known species of commercially-edible fish. This observation suggests that there is a high free-amino-acid content in king crab meat, which could help to explain the high rate of spoilage that generally occurs in crab meat. This unexpected finding, illustrating the value of fundamental studies, is of tremendous interest to the crab meat industry because, if substantiated by further research, it makes possible application of preventive measures.



OIL CONTENT OF FISH VARIES

The oil content of many species of fish can vary tremendously, depending upon many factors such as the area of capture and the season. A striking example of this variation is shown by the work of the Service's Seattle Technological Laboratory in their studies on the composition of sheephead, a common species of fresh-water

fish. In a sample of 16 sheepshead from Clearwater Lake, Minn., the oil content ranged from 0.7 to 1.7 percent and averaged 1.0 percent. In a sample from Kegonsa, Wis., the oil content ranged from 2.0 to 8.8 percent and averaged 4.9 percent. And in a sample from the Mississippi River, the oil content ranged from 3.6 to 14.2 percent and averaged 8.8 percent. Thus, depending upon where the sample was taken, sheepshead would be considered as a non-oily fish, an intermediately oily fish, or as an oily fish. Accurate knowledge of the oil content of fish is vital in certain fields, such as medicine, where patients may require a rigidly specified diet. By proper choice of fish, a diet with any desired level of oil content can be obtained.

METHODS USED TO HARVEST SEAWEEDS

Many different methods are employed in collecting the various seaweeds, each species presenting specific problems. Although few seaweeds are cultivated for harvest this is true for species of *Porphyra* in Japan. The Japanese provide surface attachment for the *Porphyra* spores. The method is to place bamboo rush or rope nets tied to stakes in the water about mid-September. They harvest this crop as growth permits, from November through April.

Gloiopeltis furcata, a red alga also found in Japan, grows on rocks in shallow water. Collection is either by long-handled rakes, or divers gather the seaweed by hand.

Along our North Atlantic shores gathering of the Irish Moss, *Chondrus crispus*, is also accomplished by rakes. The men go out before low tide and usually return to port on the flood tide. From their boats they manipulate special rakes to wedge bunches of moss between the tines and tear the plants from the rocks.

In certain countries of Europe the fucoids are systematically harvested twice a year. They are found above the low-tide marks which makes cutting easier than for the *laminaria* which grow at greater depth. Here long-handled sickles and reaping hooks are employed with the problem of finding more efficient methods of collection rendered difficult where the sea bed is irregular.

However, along the California coast the giant kelp, *Macrocystis pyrifera*, is harvested by means of underwater mowing machines and chain conveyors which carry the seaweed onto a barge. Only the tips of the plants are harvested, and these soon grow back again.

In North Carolina and Florida, where we formally had a seaweed industry, collecting is simpler. The commercial species accumulate in masses on shallow flats where they may be raked into a skiff at low tide. Where the currents are strong and deeper waters prevent this method of collection, a net may be set to accomplish the task. The seaweed is then removed before each change of tide.

These and other likely methods employing grapples, tubes and pumps, and other devices are being used or considered for this job.

--"Sea Secrets, August 21, 1956,
The Marine Laboratory,
University of Miami,
Coral Gables, Fla.



TRENDS AND DEVELOPMENTS

California

SHRIMP FISHERY MAKES STEADY GROWTH: After five years of slow but steady growth, the commercial shrimp fishery of California looks as though it's here to stay.

Almost daily deliveries are made to processors at Crescent City and Bodega Bay. The only shrimp beds in use at present are located off these widely-separated ports because facilities for processing are limited.

The catch in 1952, the first year commercial permits were issued, totaled 206,000 pounds and gradually climbed to 1,150,000 pounds in 1956. As ocean industries go, this one still is a baby, for there were only eight boats, employing 25 fishermen, active in 1956. Another 350 persons on shore derived incomes from processing the product, most of it going into vacuum-packed cans or frozen food packages.

Actually the shrimp in question is a small prawn, but is termed "ocean shrimp" to distinguish it from the smaller "bay shrimp" of San Francisco Bay. The latter is a true shrimp. The prawn being harvested off Crescent City and Bodega Bay is known scientifically as *Pandalus jordani* and in other circles is also called pink shrimp or cocktail shrimp. The ocean shrimp usually taken for the market is 3-4 inches long, with less than half of this being edible. (Outdoor California, February 1957, a monthly periodical of the California Department of Fish and Game.)

Going back to how it all started, small quantities of these shrimp, mixed with the catches of bottom fish taken by the trawl fleet, had been noted for years. Then, in 1950, 1951, and 1953 Department of Fish and Game marine biologists working from the research vessel *N. B. Scofield* charted beds of shrimp along the coast from Santa Monica to the Oregon border.

Annual catch quotas were established for each area, based on how large the beds were and how many shrimp they contained. No more beds have since been found by the industry.

Note: Also see *Commercial Fisheries Review*, September 1956, p. 1.



Cans--Shipments for Fishery Products, 1956



Total shipments of metal cans during 1956 amounted to 112,532 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 110,188 tons in 1955. During December fish canning was largely confined to the West Coast packs of tuna, sardines, and mackerel. The total pack of all fish and shellfish in 1956 was about 10 percent above the 1955 pack. The December pack of California sardines was much lower than for the same month in 1955.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reported in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons of steel by using the factor: 23.0 base boxes of steel equal one short ton of steel.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-FEBRUARY 1957: Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 2.2 million pounds of fresh and frozen fishery products were purchased in January and 1,678,000 pounds during February by the Military Subsistence Market Centers. Beginning with January 1, 1957, a change was instituted in report-

Table 1 - Fresh and Frozen Fishery Products Purchases by Military Subsistence Market Centers, January and February 1957 with Comparisons

QUANTITY						VALUE					
January		February		Jan.-Feb.		January		February		Jan.-Feb.	
1957	1956	1957	1956	1957	1956	1957	1956	1957	1956	1957	1956
(1,000 Pounds)						(\$1,000)					
2,212	1,086	1,678	1,659	3,890	2,745	1,169	746	808	850	1,977	1,596

ing the amount purchased. Instead of reporting deliveries as in the past, the Military Subsistence Supply Agency is reporting what was ordered. Therefore, this year's purchases are not directly comparable with previous years.

Assuming that purchases for the first two months of this year as compared with the same months in 1956 are roughly comparable, purchases were higher by about 42 percent for the first two months of 1957.

Canned Fishery Products: Salmon and tuna were the principal canned fishery products purchased for use of the Armed Forces during January and February 1957.

In addition to the purchases made under contract, the Armed Forces generally make some local purchases which are not included in the data given. Therefore, actual purchases are higher than indicated, but it is not possible to obtain the local purchases made by military installations throughout the country.

Table 2 - Canned Fishery Products Purchases by Military Subsistence Market Centers, January-February 1957

Month	QUANTITY			
	Tuna	Salmon	Sardines	Total
	(1,000 Pounds)			
January	-	992	1	993
February	268	-	10	277

Films

FISH AND WILDLIFE SERVICE FISHERY FILM RECEIVES CERTIFICATE FOR EDINBURGH FESTIVAL SHOWING: The Department of the Interior received certificates from the British Government for having three motion pictures (one of which was a fishery film) selected for showing during the 1956 International Festival of Music and Drama at Edinburgh, Scotland. The films were produced by two Department agencies in cooperation with private industry sponsors.

Among all motion pictures submitted by United States Government agencies during 1956, only the five were chosen for showing at the Edinburgh Festival.

The Department of the Interior was represented at the festival by one film supervised by the Fish and Wildlife Service and two produced under the supervision of the Bureau of Mines. All three half-hour films, in 16 mm. color and sound, were financed by private industry sponsors.

The three Department of the Interior films and their private industry sponsors are:

Outboard Fisherman, U. S. A. was financed by the Outboard Marine Corporation, formerly known as the Outboard, Marine and Manufacturing Company, and was produced by MPO Productions, Inc., under the supervision of the Fish and Wildlife Service. The film shows how the small independent commercial fishermen, using outboard motors, contribute to the national economy. Scenes from 10 areas in the United States and Alaska depict the catching of 10 different species of fish and shellfish, using various colorful fishing techniques.

The Petrified River--The Story of Uranium was sponsored by the Union Carbide and Carbon Corporation in cooperation with the Bureau of Mines. Produced by MPO Productions, Inc., it tells the story of the greatest metal hunt in the history of America when thousands combed the Colorado Plateau for the source material for atomic energy. The film depicts the geology of the plateau area, the search for and the drilling, mining, and milling of uranium ore. Emphasis is placed on peacetime uses of uranium in atomic energy for electric power, and the use of radio-isotopes in medicine, agriculture and biologic research.



Present at the award of the Edinburgh Film Festival Certificate for the fishery film "Outboard Fisherman, U. S. A." were (left to right): Arnie J. Suomela, Commissioner, U. S. Fish and Wildlife Service; Ross Leffler, Assistant Secretary of the Interior for Fish and Wildlife; Howard Larsen, representing the Outboard Marine Corp; and the British Ambassador to the United States.

Arizona and Its Natural Resources is the other Bureau of Mines film, this one financed by the Phelps-Dodge Corporation and produced by Frederick K. Rockett Company. It depicts the natural resources of Arizona and their development and utilization for the benefit of the State's people. This motion picture shows how the great natural resources of the Southwest-

ern United States lay untouched and unused for centuries while aborigines, early Indians, Spanish conquistadors, and Mexican colonists overlooked their value. It remained for modern man, with ingenuity and imagination, to develop these resources and to produce a rich economy in a progressive State.



Fisheries Loan Fund

LOAN APPLICATIONS TOTAL \$6.3 MILLION: Applications for fishery loans as of March 18 totaled \$6,335,000 or nearly two-thirds of the \$10 million made available for this purpose by the U. S. Fish and Wildlife Act of 1956, Assistant Secretary of the Interior Ross L. Leffler stated on March 29, 1957. Loans amounting to \$1,854,940 already have been approved.

Of the 163 applications accepted for processing, 66 are from New England for a total of \$2,207,000, 64 from Pacific Coast States for \$3,218,000, and the balance from other sections of the country and from Hawaii and Alaska.

There have been 61 applications approved since the program began last October. Of these, 25 totaling \$861,789 were to fishermen in New England; 16 totaling \$572,631 to fishermen in the Pacific Coast States; 5 totaling \$323,050 to those in the South Atlantic and Gulf States; 4 totaling \$29,220 to fresh-water fishermen; and 11 totaling \$68,250 to Alaska fishermen. Twelve loan applications for \$161,500 have been declined during the same period.

The following loans not reported earlier have been approved for New England: Estrela Corporation, Gloucester, Mass., \$57,677 for refinancing and operating expenses; Roland B. Stimpson, Pleasant Point, Me., \$2,000 to replace vessel and gear; Schooner Corporation, Boston, Mass., \$58,700, refinancing and repairs; Mrs. Tripolina Bramante, Gloucester, Mass., \$56,800, for refinancing; Dimar, Incorporated,

Gloucester, Mass., \$21,506, refinancing; United Fisheries Vessels, Gloucester, Mass., \$31,400 refinancing and operating expenses; and Philip Bodoni, \$41,099 for refinancing.

On the Pacific Coast, the following loans were approved: California--Donald Hobbs, San Diego, \$126,837 for refinancing and repairs; Edward P. Silva, San Diego, \$56,000 for refinancing. Washington--Curtis Kirkendall, \$3,000 to repair vessel and replace gear; Lawrence P. Ollsen, \$17,200 for vessel and gear replacement; and Angus and Stella McKay, \$10,000 for refinancing and installation; Karl Kaldestad, \$10,000 for vessel improvements; Jacobson Brothers, \$22,250, for basic research; and John McDermott, \$3,221 for refinancing and repairs. All of these are residents of Seattle, Wash. Frank O. Renlie, of Bellingham, received approval of a loan of \$5,500 for refinancing.

The Dixie Fisheries of Yorktown, Va., had a loan for \$8,500 for rebuilding a vessel and replacing gear approved; and the Whorton Crab Factory of New Bern, N. C., received approval for a loan of \$35,500 for vessel replacement and gear. A loan of \$20,250 was approved for E. Wallace and A. Neuman, Empire, La., for refinancing and replacement of gear.

In the Great Lakes area, a loan of \$3,920 was approved for Ernest King, Sr., Naubinway, Mich., for refinancing; the Drayton Fish Company, \$8,000 for gear replacement; and the B & L Fish Company, Port Huron, Mich., \$11,800 for refinancing and repairs.

The Alaska loans were: William A. Grenier, Sr., Petersburg, \$7,500 for refinancing and repairs; Alfred J. Steear, Ketchikan, \$20,100 to rebuild and repair a vessel; Fred E. Brandes, Jr., Ketchikan, \$14,850 for refinancing and engine replacement; Adron F. Ward, Ketchikan, \$5,000 for vessel improvement and repairs.

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, MARCH 1957, P. 19.



Fish Flour--A Weapon Against Protein Malnutrition

Because fish meal can be processed in such a way as to remove the "fishy" taste and odor, it can become an important weapon against protein malnutrition in the vast underdeveloped areas of the world, Dr. James M. Hundley, nutrition adviser to the United Nations' International Children's Emergency Fund, declared in February 1957. Hundley reported that several processes have been developed by which either fresh fish or dehydrated fish meal can be defatted, deodorized, and finished as an almost tasteless, odorless, nearly white flour.

Speaking before the Conference on Protein Nutrition in New York, under the joint sponsorship of the New York Academy of Sciences and E. I. duPont de Nemours & Co., Hundley said that such flour contains 70 to 80 percent protein and relatively small amounts are needed to supplement bread and other cereal products. Estimates are that only about one-fourth cent a day would be required to supplement a child's diet effectively with fish flour.



Florida

RED TIDE RESEARCH IN GULF OF MEXICO: The research vessel Gerda of the Marine Laboratory of the University of Miami returned to Miami early in January after a 1,000-mile trip in connection with Red Tide research in the Gulf of Mexico. It was the sixth such trip made during the past 18 months.

Operations started off Key West, Fla., and a zigzag course was followed up the west coast of Florida north to John's Pass off St. Petersburg. Measurements of currents were taken electronically, water and biological samples also were taken. The water samples were analyzed for nitrite, nitrate, phosphorus, and salinity, along with biological content. Water temperatures were recorded from surface to bottom.

Water samples were analyzed to determine their potential in supporting any type of biological activity. This is necessary to ascertain the density of biological life that may be supported by the amount of chemicals in the water. To date it has been found by scientists of the Marine Laboratory that the waters of the Gulf of Mexico are capable of supporting the Red Tide organisms at any time.

However, while this is true, and the Red Tide organisms are always present in the water, it is not until these organisms increase to large numbers that a so-called Red Tide is formed, killing fish and other marine life.

It has been ascertained that the outflow of the principal rivers on Florida's west coast may, under certain conditions, cause harmful Red Tides. These waters mixing with each other in the Gulf of Mexico in relation to amounts, timing, weather, and current speeds create an optimal condition in which Red Tides flourish. Scientists at the Marine Laboratory base their predictions on this hypothesis.

Through the use of this method, which was formulated by an assistant professor at the Marine Laboratory, the Red Tide outlook for the year from October 1955 to September 1956 was successfully predicted, even though the scientist looks upon the method as a tentative one subject to improvement as the research work continues.

The prediction from October 1956 to September 1957 indicates there will be small likelihood of any major Red Tide outbreak.



Maine

GOVERNOR PROCLAIMS APRIL 11 AS SARDINE DAY: Complimenting the Maine sardine canners on their efforts to "improve and enlarge an industry which gives employment to thousands of our citizens," Governor Edmund S. Muskie proclaimed April 11 as Maine Sardine Day.

He said that the opening of the industry's modern research and quality control laboratory in Bangor on that date prompted him to "give this deserved recognition of cooperative action by the canners to meet changing conditions in the food business." Simultaneously he signed into law legislation to strengthen State sardine inspection and quality control.

For the past six years the industry has operated a 25-cents-a-case State tax-financed development program under the direction of the Maine Sardine Council.

In signing the proclamation on April 6, the Governor suggested to the people of Maine that they serve "this good seafood product on Maine Sardine Day to also show their appreciation of the vital role the industry has played in Maine's economy for seventy-five years."



Maine Sardines

INCLUDED IN NATIONAL SCOUT JAMBOREE MENU: Maine sardines have been selected as one of the major sandwich fillers for serving to the more than 50,000 young men who will attend the National Boy Scout Jamboree to be held at Valley Forge, Pa., in July 1957. The Executive Secretary of the Maine Sardine Council said that the selection had been made by National Scout Headquarters after exhaustive tests and that his organization was cooperating to the fullest extent.



Sardine sandwiches made from oil and mustard packs will be served to the 1,300 troops of 40 scouts each as a quick-lunch item, both upon arrival and departure and this will require about 500 cases (100-cans each) of canned Maine sardines.

The Jamboree menu will be used as a model for camping trips and outings by the several hundred Scout organizations in the country for the next two years. This is the first time that canned sardines have been included in a Jamboree menu.



Market Outlook for Fishery Products

APRIL-JUNE 1957: Fresh fish of practically every variety will be available in quantity during the April-June quarter as production climbs to peak levels for many sections of the industry, according to the Commercial Fisheries Outlook, April-June 1957 published by the United States Fish and Wildlife Service.

Oyster production will cease during the quarter, and the northern Atlantic lobster catch will be at a seasonal low. Production of other shellfish, shrimp, sea scallops, hard and soft crabs, and soft and surf clams, will increase. However, dungeness crab production on the Pacific Coast will hit a peak early in the quarter and then decline as the effort switches to other fisheries.

Salmon trolling in the Canada-Pacific Coast area is being delayed until April 15, by agreement. The halibut season opening date this year is May 1.

The New England landings will follow the general big season pattern. Haddock and ocean perch, followed by flounders, sole, and cod will dominate.

Domestic landings of fresh-water fish will also reach a seasonal peak. Receipts at Chicago should approximate 15 million pounds for the quarter.

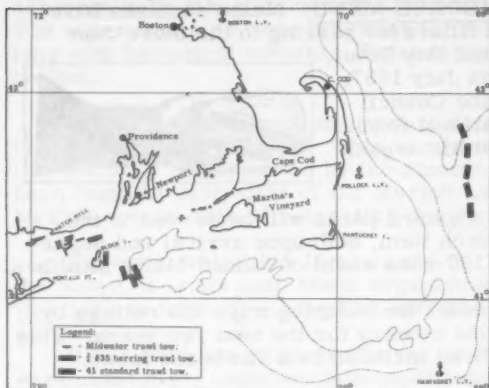
The pack of canned sardines in Maine will be lower if the usual pattern of lighter packs in odd-numbered years repeats. Last year the pack was good but it was not as high as in some previous years. The Pacific mackerel pack is usually low during this second quarter. In the tuna fishery, its usual pattern calls for increased landings and pack. Salmon canning will not get under way until the end of the quarter with the new supplies reaching the market in the fall.



North Atlantic Fisheries Exploration and Gear Research

MIDWATER TRAWL GEAR TESTS IN BLOCK ISLAND SOUND AREA (M/V Delaware Cruise 57-2): In the Block Island Sound area midwater trawl gear tests were conducted by the Service's exploratory fishing vessel Delaware, February 12-22.

Light concentrations of fish were located with the aid of echo-sounding equipment and experimental tows were made on these concentrations with a standard Canadian nylon midwater trawl (approximately 35-foot square-mouth opening, 5" mesh taper to 1 $\frac{3}{4}$ " mesh). Only a small number of alewives (*Pomolebus pseudo-harengus*) and two whiting (*Merluccius bilinearis*) were taken during the experimental tows. From all measurable indications the gear was fishing properly. Handling the midwater trawl and spreader doors attached to five-fathom pendant lines presented no special problem in setting and hauling back.



M/V Delaware Cruise 57-2 (Feb. 12-22, 1957).

Eight tows were made with No. 35 small-mesh Canadian herring otter trawl (headrope 36 feet, footrope 51 feet, 2" mesh). Over 6,200 pounds of herring (*Clupea harengus*) and alewives were brine-frozen for use as tuna long-line bait during the next cruise. Small numbers of shad (*Alosa sapidissima*) were also taken in the bottom trawl. Five tows with the standard No. 41 otter trawl (headrope 79 feet, footrope 110 feet, 4 $\frac{1}{2}$ " mesh) with a full set of rollers in the South Channel area yielded 700 pounds of haddock (*Melanogrammus aeglefinus*) and 1,300 pounds of pollock (*Pollachius virens*) for technological tests.

The Delaware was scheduled to depart from East Boston on March 12 for a five-week exploratory cruise in the offshore Atlantic. This is the first of several cruises planned in that area. The vast areas of the NW. central Atlantic were to be fished with commercial-style long-line gear to explore the potential of its subsurface fishery resources. The major objective of the exploration was to obtain additional information on the distribution of stocks of the several species of tuna and tunalike fishes and the winter habits of the schooling bluefin tuna (*Thunnus thynnus*) common to New England waters during the summer months.



Pacific Coast Fishing Ports

BAY CITY, ORE.:
Bay City is a small fishing community located on Tillamook Bay in northern Oregon. This article, which is one in a series of photographic reports on the fishing centers of the United States and its territories, shows the activities in Bay City in September 1956.



Fig. 1 - Fish- and oyster-processing plants at Bay City.



Fig. 2 - A fish and crab company. This building is the one seen on the left, on the end of the peninsula, in fig. 1. The boat shown here is a double-ended, 26-foot, Columbia River-type gill net boat.



Fig. 4 - Net in a solution of bluestone (copper sulfate). Ten pounds of bluestone are used per net per week. The nets are left in the solution for 2 to 3 hours and then are placed on the racks to dry.



Fig. 5 - End of the dock of the fish and crab company shown in fig. 2. The principal products of this company are chinook, silver, and chum salmon and fresh crab and crab meat.



Fig. 3 - Fisherman repairing gill net used to catch chinook and silver salmon in the waters of Tillamook Bay near Bay City. The net is made of 6 $\frac{1}{2}$ -inch-mesh netting and is 140 fathoms long and 30 meshes deep. Sets are made 3 hours before low water. Depending upon the season, this fisherman also fishes on the Columbia River and in Bristol Bay, Alaska. He thus is able to work as a fisherman substantially the year around.



Fig. 6 - View taken from end of peninsula on opposite side of that shown in fig. 1. The building on the left houses another fish company which sells principally fresh salmon. The center building in the right foreground is that of the Oregon Fish Commission. The end building on the right is a landing dock for the fish and crab company shown in fig. 2.



Fig. 7 - Mending a gill net



Fig. 9 - Set-net stakes for stationary gill net. The stationary gill nets catch chum salmon principally.



Fig. 10 - Field laboratory of the Oregon Fish Commission. Some years ago, this building, which is the center one in the right foreground of fig. 6, was used in a fresh-crab operation.



Fig. 8 - Preparing set-net stakes for stationary gill nets. These stakes must be peeled and sanded. Otherwise the nets will catch on the bark and tear in the swells. The stakes are about 35 feet long and are made from hemlock poles obtained at Sand Lake, which is 18 miles from Bay City. The building shown here is the end building on the right in fig. 6.



Fig. 11 - An oyster company. The products are fresh oysters, and oyster stew. This building is the one shown on the extreme right in fig. 1.



Fig. 12 - Handling trays of canned oyster stew at resort inside company shown in fig. 11.



Fig. 13 - Labeling cans of oyster stew inside company shown in fig. 11.

Note: The author gratefully acknowledges the aid of Fred C. Cleaver, Supervisory Fishery Research Biologist, U. S. Fish and Wildlife Service (formerly Assistant State Fisheries Director, Oregon Fish Commission).

--BY F. BRUCE SANFORD, CHEMIST
FISHERY TECHNOLOGICAL LABORATORY,
BRANCH OF COMMERCIAL FISHERIES,
U. S. FISH AND WILDLIFE SERVICE, SEATTLE, WASH.

Pacific Oceanic Fishery Investigations

SUMMER TUNA FISHERY AND BAIT POTENTIALITIES OF MARQUESAS AND TUAMOTU ISLANDS: The summer tuna fishery and bait potentialities of the Marquesas and Tuamotu islands were being investigated early in 1957 by all three of the Service's Pacific Oceanic Fishery Investigations research vessels. In this "task force" approach to fishery biology, the Hugh M. Smith was studying the oceanic circulation of the area; the John R. Manning was sampling the deep-swimming tunas by long-line fishing; while the Charles H. Gilbert was live-bait fishing and assessing the available natural bait supplies in those islands of French Oceania.

John R. Manning, using 60 11-hook baskets a day, as of the end of February had fished a total of 33 days and reported a catch of 322 yellowfin, 35 skipjack, 48 big-eyed, 24 albacore tuna, 165 shark, and 56 miscellaneous fish such as marlin, swordfish, etc. Of the total yellowfin caught, 210 were taken at stations near the Marquesas, with the best day's catch yielding 54 yellowfin, 2 albacore, 16 shark, and 3 miscellaneous fish.

The Charles H. Gilbert, which arrived in the Marquesas on January 24, reported sighting a total of 263 surface schools: 30 yellowfin, 128 skipjack, and 105 unidentified. Using principally the local Marquesan sardines as bait, 104 of the schools were chummed and of those fished, a total of 2,829 skipjack and 81 yellowfin were caught. A total of 769 of the skipjack were tagged with the new POFI dart tag and released. In the Marquesas area, 718 skipjack were taken from one school, 311 from another. In the Tuamotus, one of the schools yielded 506 skipjack and another

455. The schools, in general, were wild and fast moving. On some days, several schools were sighted and chummed but the fish would not bite.

The concentrations of bait varied from island to island. In one report from the Marquesas, 6,000 buckets were sighted near Taio Hae and, in another, 1,500 at Nuku Hiva. In other bays, varying amounts were observed, some with negligible quantities. However, particularly when compared with the quantities observed during the Marquesas winter, bait supplies were abundant.

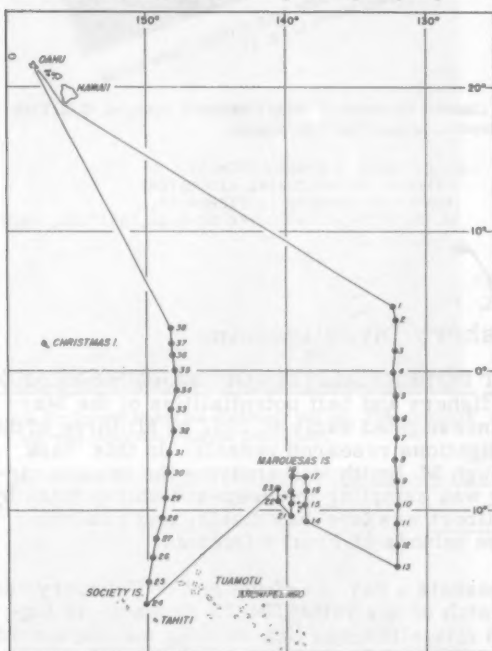
The Hugh M. Smith, which proceeded south along 130° W. longitude, suffered a breakdown of the main drive shaft near 13° S. With the assistance of the U. S. Coast Guard, repairs were effected and the vessel proceeded with the oceanographic survey.

* * * * *

DEEP-SWIMMING YELLOWFIN TUNA SAMPLED BY LONG-LINING IN MARQUESAS AREA (M/V John R. Manning Cruise 34): Sampling the abundance and distribution of large deep-swimming yellowfin and albacore tuna by long-lining in the eastern Pacific was the principal purpose of the Service's fisheries research vessel John R. Manning's cruise 34 (January 4-

March 12, 1957). Long-lining in the Marquesas and Society islands area (a potential fishing ground for the United States tuna fleet) yielded 23 tons of yellowfin tuna in 38 fishing days. Smaller quantities of albacore, big-eyed, and skipjack, tuna were also caught. Simultaneously with the John R. Manning, two other Honolulu-based Service vessels studied the live-bait and surface tuna resources and the oceanic environment of the region.

John R. Manning fished one series of long-line stations southward across the equator to a position southeast of the Marquesas Island group, another series among the islands, and after refueling at Tahiti, a third line of stations was fished northward across the equator on the longitude of 148° W. Although the abundance of deep-swimming yellowfin tuna was generally low on the two longitudinal sections, some excellent long-line fishing was experienced in the Marquesas, particularly in the southwestern part of the archipelago. Yellowfin tuna catch rates there were as high as 8 fish per 100 hooks per day, and the tuna were large, averaging 139 pounds each.



John R. Manning Cruise 34 (Jan.-Mar. 1957).

Fishing 60 baskets of longline (660 hooks) at 38 stations produced a catch of 355 yellowfin tuna (approximately 23 tons), 51 big-eyed, 24 albacore, 36 skipjack, 44 spearfish, 6 wahoo, 5 barracuda, and 333 shark. Results on both longitudinal sections across the equatorial zone indicated low levels of yellowfin abundance. On 132° W., between $4^{\circ}30'$ N. and 14° S., only 4 out of 13 stations had yellowfin catch rates of more than 1 fish per 100 hooks.

Only the station at $3^{\circ}30'$ S. produced even moderately good fishing, with 4 yellowfin per 100 hooks. For the 15 stations on the 148° W. section, between $16^{\circ}30'$ S.

and 3° N., the best catch rate was 1.5 yellowfin at station 35, on the equator, and only 1 other station had a catch rate of over 1. A considerably greater abundance of deep-swimming yellowfin was shown by the 10 stations fished among the Marquesas Islands. There the catch rate averaged 3.45 fish per 100 hooks, only 2 stations produced less than 1 yellowfin per 100 hooks, and 2 stations, 20 and 33, south of Nuku Hiva Island had the excellent catch rates of 7.58 and 8.18, respectively. Yellowfin weight averaged 134 pounds each, on 132° W., 139 pounds in the Marquesas area, and 131 pounds on 148° W. Shark damage to yellowfin varied greatly from one station to another, but amounted to about 21 percent for the whole cruise.

Albacore were not taken north of 11° S. on 132° W. nor north of $7^{\circ}25'$ S. on 148° W., and 4 was the greatest number taken at any station. They ranged from 35 to 50 each, averaging 40 pounds. The fact that most of the albacore were caught on the deepest parts of the set indicates that the long line may not have been fishing deep enough to sample this species adequately.

Trolling for 779 line-hours between stations and along the long-line sets produced a total catch of 7 skipjack, 2 yellowfin, 2 big-eyed, 12 dolphin, 2 wahoo, and 1 sea snake snagged on a jig. The wheel watch routinely recorded surface tuna schools, bird flocks, and other marine life observed while underway.

Biological data on food and reproductive condition were recorded for all fish taken, and frequent measurements of surface and subsurface water temperatures provided information on the environment in which the tuna were found. Fifteen extra-large yellowfin tuna were filleted and frozen for use in processing experiments designed to improve the commercial acceptability of the big tuna which form a large part of long-line catches.



Sport Fishing and Hunting License Holders Highest on Record

Once again a record has been set in the number of license holders for sport fishing and wild-game hunting in the United States, the Secretary of the Interior reported on February 10. California replaced Minnesota as top-ranking State in fishing licenses but Michigan, the only State to record more than a million hunting license sales, retained its lead in hunting.

U. S. Fish and Wildlife Service compilations show that during the fiscal year ending June 30, 1956, there were 33,163,831 hunting and fishing license holders in this country, an increase of 117,470 over the previous record set in the fiscal year ending June 30, 1955.

An increase of 270,296 hunting license holders is responsible for the new record. Fishing li-



FISHERMAN IN LARGE SPRING NEAR PAGE DAM.

State Fishing Licenses Issued in the United States, July 1, 1955 to June 30, 1956				
State	Paid Fishing License Holders			Total Cost to Anglers for All Licenses, Permits Stamps, etc.
	Resident	Non-Resident	Total	
Alabama	635,596	24,649	660,245	\$ 750,444
Arizona	97,943	62,878	160,821	420,115
Arkansas	274,912	135,346	410,258	764,447
California	1,303,256	19,934	1,319,190	3,902,898
Colorado	237,524	107,728	345,252	242,002
Connecticut	99,890	7,757	107,647	357,928
Delaware	6,635	885	7,520	16,400
Florida	275,602	178,728	454,330	936,134
Georgia	337,620	7,754	345,374	461,264
Idaho	140,712	52,340	193,052	606,265
Illinois	728,842	10,959	739,801	864,210
Indiana	808,277	38,835	847,112	927,464
Iowa	364,807	16,235	381,042	546,240
Kansas	217,202	5,850	223,052	456,299
Kentucky	338,455	77,793	416,248	878,399
Louisiana	187,466	33,369	220,835	295,955
Maine	129,075	72,046	201,121	744,706
Maryland	107,837	23,051	130,888	238,406
Massachusetts	262,506	4,793	267,299	601,908
Michigan	876,670	275,992	1,152,662	4,770,121
Minnesota	935,002	296,845	1,231,847	2,353,972
Mississippi	131,631	34,160	165,791	379,799
Missouri	509,483	55,606	565,089	1,432,810
Montana	192,353	43,097	235,450	839,828
Nebraska	208,770	9,860	218,630	382,701
Nevada	38,198	23,556	61,754	182,038
New Hampshire	74,201	44,796	118,997	396,499
New Jersey	143,136	10,061	153,197	605,859
New Mexico	65,070	31,583	96,653	366,603
New York	677,353	42,427	719,780	1,628,456
North Carolina	332,648	32,461	365,109	652,435
North Dakota	72,438	1,918	74,356	78,602
Ohio	830,898	41,177	872,075	1,766,917
Oklahoma	364,968	71,804	436,772	948,542
Oregon	300,959	28,488	329,447	1,212,800
Pennsylvania	492,514	27,199	519,713	1,839,567
Rhode Island	17,925	842	18,767	42,942
South Carolina	250,962	15,948	266,910	492,351
South Dakota	90,499	41,972	132,471	279,774
Tennessee	562,062	164,367	726,429	860,936
Texas	467,551	9,893	477,444	736,276
Utah	117,110	8,800	125,910	379,842
Vermont	72,444	34,287	106,731	249,838
Virginia	359,521	13,631	373,152	573,843
Washington	389,275	21,497	410,772	1,496,482
West Virginia	183,791	8,841	192,632	382,091
Wisconsin	680,990	33,148	714,138	2,270,264
Wyoming	116,840	60,484	177,324	657,783
TOTALS	16,039,876	2,662,107	18,701,983	\$42,149,674

1/ This is the gross cost to the fishermen for various types and categories of licenses issued by the respective States for the privilege of fishing and/or possessing fishes.

censes decreased by 152,826. In spite of the drop in fishing and the gain in hunting licenses, fishing is still the more popular sport. A total of 18,701,983 licenses were sold for angling compared with 14,461,848 for hunting. Conversely, the hunters paid the greater amount for their licenses, tags, permits, and stamps—\$46,638,220 compared with \$42,149,674 for fishing licenses, permits, and stamps. During the year previous, the total cost to hunters for all licenses was \$42,790,687 and to fishermen \$39,501,838.

There were 14,088,608 resident-hunting license holders and 373,240 non-resident; those holding resident fishing licenses total 16,039,876 and the nonresidents total 2,662,107.

Under the Federal aid formulas for the distribution of Pittman-Robertson funds for the restoration of game and the Dingell-Johnson funds for the restoration of fish, the number of license holders (not the amount paid for licenses) is one factor considered.

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, APRIL 1956, P. 24.

United States Fishing Fleet^{1/} Additions

FEBRUARY 1957: A total of 31 fishing vessels of 5 net tons and over were issued first documents as fishing craft during February 1957, according to the U. S. Bureau of Customs. This was 5 vessels more than the number reported for the same month last year.

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft, by Areas, February 1957 with Comparisons

Area	February		Jan.-Feb.		Total
	1957	1956	1957	1956	
	(Number)				
New England . . .	2	3	3	4	15
Middle Atlantic . .	3	3	5	5	26
Chesapeake	9	3	17	8	138
South Atlantic . .	3	6	11	10	119
Gulf	9	7	10	10	100
Pacific	3	2	5	3	76
Great Lakes . . .	-	-	-	-	6
Alaska	2	1	6	2	40
Hawaii	-	1	-	1	1
Total	31	26	57	43	521

Note: Vessels assigned to the various sections on the basis of their home port.

Table 2 - Vessels Issued First Documents as Fishing Craft, by Tonnage, February 1957

Net Tons	Number
5 to 9	12
10 to 19	6
20 to 29	3
30 to 39	6
40 to 49	1
50 to 59	1
180 to 189	1
360 to 369	1
Total	31

The Chesapeake and Gulf areas led with 9 newly-documented vessels each, followed by the Middle Atlantic, the South

Atlantic, and the Pacific areas with 3 each. New England and Alaska had 2 newly documented vessels each.

^{1/} Includes both commercial and sport fishing craft.

A total of 57 fishing vessels was documented for the first time during the first two months of 1957--an increase of 14 craft, or 33 percent, compared with the corresponding period last year. During the two-month period of 1957, the Chesapeake led all other areas with 17 newly-documented vessels, followed by the South Atlantic with 11, and by the Gulf with 10.



U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, DECEMBER 1956: United States imports of edible fresh, frozen, and processed fish and shellfish in December 1956 were 1.6 percent less in quantity, but up 5.5 percent in value as compared with the previous month. Compared with December 1955, the imports for December 1956 were almost the same in quantity, but 1.2 percent more in value. December 1956 imports averaged 30.9 cents a pound as compared with 30.5 cents a pound for the same month in 1955. A comparison of the December 1956 imports of leading edible fishery products with those for December 1955 shows that the drop in groundfish fillets, frozen, and canned salmon, canned crab meat and lobster meat, and canned tuna was more than offset by increases in fillets other than groundfish, canned sardines, frozen spiny lobsters, and frozen tuna.

Exports of processed edible fish and shellfish in December 1956 declined about 13 percent in quantity as compared with the previous month and were 20 percent below December 1955. The December 1956 value of these exports was 43 percent lower than the previous month, and down about 20 percent from the same month a year earlier.

Because of the very poor sardine season on the Pacific Coast this past season, canned sardine exports in December 1956 were only one-fourth of those for the same month in 1955, which accounts for part of the decline in the exports of fish and shellfish.

United States Foreign Trade in Edible Fishery Products, December 1956 With Comparisons						
Item	Quantity			Value		
	Dec.	Year		Dec.	Year	
	1956	1955	1955	1956	1955	1955
	. (Millions of Lbs.)			. (Millions of \$)		
Imports:						
Fish and shellfish:						
Fresh, frozen & processed ^{1/}	56.4	56.4	769.5	17.4	17.2	206.4
Exports:						
Fish & shellfish:						
Processed ^{1/} only (excluding fresh & frozen)	7.9	9.9	88.3	1.6	2.0	21.6
^{1/} Includes pastes, sauces, clam chowder and juice, and other specialties.						

GROUNDFISH FILLET IMPORTS LOWER IN FEBRUARY 1957: Imports of groundfish (including ocean perch) fillets and blocks during February 1957 totaled 7.0 million pounds as compared with 11.0 million pounds imported during the same month of 1956--a decrease of 36 percent. The decrease was primarily due to reduced imports from Canada, and no imports from Iceland.

Total groundfish and ocean perch fillet imports into the United States during the first two months of 1957 amounted to 26.0 million pounds as compared with 26.5 million pounds during the same period of 1956. Canada with 18.6 million pounds led all other countries exporting fillets to the United States during the first two months of 1956, followed by Iceland (5.1 million pounds) and Norway (1.9 million pounds). These three countries accounted for 98 percent of the total imports for the first two months of 1957.

NOTE: SEE CHART 7 IN THIS ISSUE.

IMPORTS AND EXPORTS OF SELECTED FISHERY PRODUCTS, JANUARY 1957: Imports: GROUND FISH: Fillets imported during January 1957 totaled 11.7 million pounds, a decline of 5 percent from the same month a year ago. Cod and haddock fillets declined by 17 percent, while ocean perch fillets increased by 63 percent.

Blocks and slabs imported in January totaled 6.6 million pounds, an increase of 133 percent from the same month of 1956.

FROZEN TUNA: Imports of 12.5 million pounds in January were 11 percent more than January 1956. Albacore imports declined 61 percent, but other frozen tuna showed a gain of 63 percent.

CANNED TUNA: January imports of almost 2 million pounds were down 16 percent from a year ago.

CANNED BONITO: Imports of 1.6 million pounds were only slightly below a year ago.

CANNED SALMON: Imports of 4.5 million pounds during January were almost double those in the same month of 1956. Imports were all from Japan.

CANNED SARDINES: A total of 1.8 million pounds were imported during January, a gain of 7 percent from a year ago.

SWORDFISH: January imports of 1.4 million pounds declined by 14 percent from a year ago.

SHRIMP: Total imports in January were 5.7 million pounds--a decline of 35 percent from a year earlier due to smaller receipts from Mexico.

LOBSTERS AND LOBSTER TAILS: Fresh and frozen lobster and lobster tail imports this January of 4.8 million pounds were 51 percent above those for January 1956.

CANNED CRABMEAT: Imports during January amounted to 305,000 pounds, a decline of 29 percent from same month of 1956.

FISH MEAL: Imports of 4,219 tons were 62 percent less than during January 1956.

Exports: CANNED SARDINES: Exports of 2.6 million pounds of canned sardines during January 1957 were 69 percent less than in same month of a year ago.

CANNED MACKEREL AND JACK MACKEREL: Exports of 2 million pounds represented large gains over a year ago as a result of large shipments to the Philippines.

FISH OIL: January exports totaled 16.6 million pounds, up 28 percent from those of the same month a year earlier.

* * * * *

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA PROVISIO: The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1957 at the 12½-percent rate of duty is limited to 44,528,533 pounds. Any imports in excess of that quantity will be dutiable at 25 percent ad valorem.

Imports under the quota from January 1-March 2, 1957, amounted to 3,726,080 pounds, according to data compiled by the Bureau of the Customs. This leaves a balance of 40,802,453 pounds of the quota which may be imported during the balance of 1957 at the 12½-percent rate of duty.

* * * * *

UNITED STATES FISH OIL EXPORTS DECLINE IN 1956; Fish oil exports from the United States in 1956 totaled 70,402 short tons, slightly less than the record 71,336 tons exported in 1955.

United States Fish Oil Exports by Country of Destination, Average 1935-39, Annual 1952-56						
Country of Destination	1956 ^{1/}	1955 ^{1/}	1954	1953	1952	Average 1935-39
	(Short Tons)					
NORTH AMERICA:						
Canada	1,603	11,251	7,511	2,108	488	458
Cuba	85	83	126	87	100	155
Mexico	66	81	118	114	122	45
Other	28	1	-	1	3	71
Total	1,782	11,416	7,755	2,310	713	729
SOUTH AMERICA	62	56	148	63	38	96
EUROPE:						
Belgium-Luxembourg . .	750	1,098	-	764	8	8
Denmark	866	-	-	-	-	-
France	13	9	-	7	149	19
Western Germany . . .	32,490	10,503	10,481	36,155	6,232	126
Italy	60	106	85	28	220	15
Netherlands	24,075	39,642	43,692	8,913	11,967	15
Norway	6,251	6,758	1,102	1,606	-	10
Sweden	2,646	-	-	-	-	7
Switzerland	367	646	5,797	3,115	3,140	15
United Kingdom	920	881	1,376	299	-	77
Other	-	23	27	23	43	8
Total	68,438	59,666	62,560	50,910	21,759	300
ASIA:						
Philippines, Republic of .	4	-	233	860	546	66
Other	5	55	51	37	20	24
Total	9	55	284	897	566	90
AFRICA	25	68	70	53	3	19
Grand Total	3/70,402	2/71,336	70,817	54,233	23,079	1,234

^{1/} Preliminary.

^{2/} Includes 75 tons whose destination is not indicated.

^{3/} Includes 86 tons whose destination is not indicated.

Western Europe again was the major market, taking 97 percent of the total or almost 9,000 tons more than in the previous year. West Germany and the Netherlands continued to be the principal buyers of United States fish oil. Exports to West Germany in 1956 were almost 3 times the 1955 tonnage, while exports to the Netherlands declined about 40 percent from the previous year. Exports to Canada dropped to less than 2,000 tons as compared with over 11,000 in 1955.



Wholesale Prices, February 1957

Most of the major United States fisheries active during February experienced a normal month with weather conditions, on the average, much improved over the previous month.

In February 1957, the over-all edible fish and shellfish (fresh, frozen, and canned) wholesale price index (115.3 percent of the 1947-49 average) dropped 5.3 percent below that for January, but was slightly higher (1.4 percent) than that for February 1956. Except for a substantial drop in the prices for fresh drawn haddock and fresh haddock fillets at Boston in February, changes in the wholesale prices for the other individual items in the index were slight.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, February 1957 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices ¹ / (\$)		Indexes (1947-49=100)			
			Feb. 1957	Jan. 1957	Feb. 1957	Jan. 1957	Dec. 1956	Feb. 1956
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					115.3	121.8	116.1	113.7
<u>Fresh & Frozen Fishery Products:</u>					124.9	136.2	126.6	121.7
<u>Drawn, Dressed, or Whole Finfish:</u>					113.0	134.1	118.6	114.1
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.06	.14	60.7	143.6	92.7	86.9
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.34	.35	105.2	108.3	108.3	97.5
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.64	.64	142.7	143.8	143.8	134.3
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.69	.59	171.1	146.3	151.2	181.0
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.75	.70	151.7	141.5	143.6	131.4
Lake trout, domestic, No. 1, drawn, fresh	Chicago	lb.	.70	.57	143.4	116.8	145.4	150.6
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.65	.60	152.4	140.7	84.4	129.0
<u>Processed Fresh (Fish & Shellfish):</u>					132.6	140.3	134.7	127.6
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.26	.46	89.5	156.2	103.8	110.6
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.83	.82	130.4	128.8	129.6	121.7
Oysters, shucked, standards	Norfolk	gal.	5.875	6.12	145.4	151.6	148.5	139.2
<u>Processed, Frozen (Fish & Shellfish):</u>					124.4	122.7	118.2	116.5
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.40	103.4	103.4	103.4	102.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.31	.30	97.3	87.9	87.9	92.6
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.29	.28	114.8	114.8	110.8	114.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.85	.84	131.2	130.0	126.0	119.6
<u>Canned Fishery Products:</u>					101.5	101.5	101.2	102.4
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	22.65	22.65	120.0	120.0	120.0	120.0
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.20	11.20	80.8	80.8	80.8	85.1
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	9.00	9.00	105.0	105.0	105.0	83.2
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	cs.	7.95	7.95	84.6	84.6	81.9	89.9

¹/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

A sharp drop (down 57.7 percent) in prices for fresh large drawn haddock from January to February was responsible for the 15.7 percent decline in the index for the drawn, dressed, or whole finfish subgroup. As a rule, heavy landings of groundfish (chiefly haddock) from the Northwest Atlantic fishing banks at Boston on any one day will cause prices to drop precipitously if the supply exceeds the immediate fresh and frozen trade needs. Pacific halibut wholesale prices at New York also showed signs of weakness in February. The four fresh-water items in the subgroup were priced higher in February. Supplies of Great Lakes whitefish, lake trout, and yellow pike were quite light in February, and as a result prices rose. When com-

pared with February 1956, the drawn, dressed, or whole finfish subgroup index for this February was down only by about one percent in spite of substantially lower had-dock prices. Higher wholesale prices for the other subgroup items this February as compared with February 1956 just about compensated for the lower drawn had-dock prices.

The fresh processed fish and shellfish subgroup index in February 1957 was lower by 5.5 percent when compared with the previous month, but was higher by 3.9 percent as compared with the same month in 1956. Lower fresh haddock fillet prices (down 44.1 percent) this February and shucked oyster prices (down 4.1 percent) from January were only partially offset by slightly higher prices for fresh shrimp (up 1.2 percent). On the other hand, lower fresh haddock fillet prices in February 1957 were more than offset by higher shrimp (up 7.1 percent) and oyster (up 4.5 percent) prices when compared with February 1956.

Changes between January and February 1957 in the frozen processed fish and shellfish subgroup prices were slight--the index for the subgroup went up only 1.4 percent from January to February but rose 6.8 percent when compared with February 1956. Frozen haddock fillets went up about 3.3 percent and frozen shrimp prices went up 1.0 percent from January to February. All the items in this subgroup were priced higher in February 1957 than for the same month in 1956, except for frozen ocean perch fillet prices which remained unchanged. Frozen shrimp prices at Chicago increased 9.7 percent from February 1956 to February 1957.

The canned fishery products subgroup index in February 1957 was unchanged from the previous month and lower by less than one percent as compared with February 1956. The market for canned fish was steady with stocks of California sardines and salmon quite light at the packers' level. Maine sardine supplies were light to moderate and canned tuna plentiful.



PREDICTING COLOR OF CANNED SALMON

A practical test to predict the color of canned salmon is reported. Sample slices of fresh salmon flesh are dipped into glycerine at 435° F. (224° C.) and the resulting color change is similar to that produced on canning the product. This technique is expected to be of value in the sorting of salmon on a color basis prior to canning, an operation which at the present time is not always successful because color of the fresh meat in certain species does not have consistent relation to the color of the canned product.

Experiments on the elimination of curd in canned salmon have shown that although dipping of the fish in phosphoric acid gave the best appearing product, the tartaric acid-treated product was better in flavor.

--Annual Report of the Pacific
Fisheries Experimental Station,
Fisheries Research Board of Canada.



International

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

MEETING HELD IN TOKYO MARCH 1957: Important fisheries meetings in Tokyo during March 1957 were attended by a number of Canadian, American, and Japanese delegates. The meetings were held by the International North Pacific Fisheries Commission, which was formed by a tripartite Treaty between Canada, Japan, and the United States in 1953 for the conservation of stocks of fish on the high seas of the North Pacific Ocean. The treaty covers an ocean area of 32 million square miles. Approximately one-third of the world's supply of fish is taken in the area by the nations signatory to the tripartite Treaty and other bordering nations, including China and the U.S.S.R.

During 1955 and 1956 the Commission has undertaken a research program of record size in the area extending northward from the latitude of San Francisco to near the Bering Strait at the entrance to the Arctic Ocean and across to the Asiatic shores. Twenty ocean-going research vessels occupied stations throughout this vast and stormy expanse in 1956.

Principle subject of research at present is a determination of whether or not salmon from Asian streams mingle in the sea with salmon from the streams of North America. If the Commission finds that salmon from the two continents mix on common feeding grounds in mid-ocean, it must draw dividing lines based on scientific research which will most equitably divide the stocks.

The Tokyo meetings were divided into two series. During the week beginning on March 11 representatives of the three countries discussed the status of the salmon, herring, and halibut fisheries along the Pacific coast of Alaska, British Columbia, and the United States. Japan has agreed in the Treaty to abstain from fishing these stocks, on the condition that the United States and Canada maintain a maximum sustainable annual harvest from them, coupled with a full research program and adequate enforcement of conservation measures. The committee studied reports dealing with this complex and important question and advised the Commission on the need for further studies. Beginning in 1958 the Commission must decide annually if stocks of fish protected under the abstention clause of the Treaty continue to qualify, or if the abstention should be lifted.

During the week of March 18, the Commission's Committee on Biology and Research met to plan and coordinate details of the 1957 research program. Oceanographic research vessels connected with this program have departed for North Pacific waters. They will be followed by vessels studying distribution of salmon throughout their range and later by other vessels engaged in mid-ocean tagging of salmon, for later recovery in their home areas.

NORTH SEA FISHING CONVENTION

SWEDISH ASSOCIATION COMMENTS: The editor of *The Swedish West Coast Fisherman*, the organ of the Swedish West Coast Fishermen's Central Association, writing in the association's journal, states that at the time the North Sea

Convention became effective on April 5, 1954, it was considered a good method to protect the growth of fish in the North Sea and other affected waters. Several other plans, he says, had been tested and abandoned before this convention, prescribing minimum sizes of fish and meshes, was agreed upon. A summary of the article supplied by the United States Consulate at Goteborg in a January 29 dispatch follows:

It was soon found that the convention "had many and great weaknesses." The size of mesh suitable for the catching--and protection--of cod, haddock, coalfish, plaice, etc., was not suitable for catching herring, mackerel, prawns, crayfish, etc. For the latter species exceptions had to be made with regard to the size of the mesh, and these exceptions made it possible to continue catching small fish of all categories. All of these small fish, however, could not be used and sold, but they were caught and killed. The result has been that "today all countries concerned are agreed that the purpose of the convention has not been fulfilled."

The Permanent Commission for the North Sea Convention has therefore taken up for consideration certain amendments or additions, and in September 1955 a special committee was appointed to examine the question scientifically.

In order to facilitate the work, the member countries were requested to answer certain questions. One of these was whether any additional types of fish should be added to the list of protected fish or whether any kind of fish now protected should be removed from the list.

Replies have been received from all participating countries with the exception of Iceland. It was found that most of the countries concerned, including Sweden, Norway, and Great Britain, did not want any changes at the present time in the list of protected and unprotected fish. France considered that whiting should be removed from the list of protected fish because "there is no evidence of excess fishing of this kind." Denmark suggested that both whiting and sand dab be taken off the list "as it is not known that minimum sizes for these kinds of fish are suitable for fishing on the whole." It was also pointed out, that small whiting are valuable for fishing in some countries and that the sand dab is a serious food competitor of some of the more valuable fish types, for example plaice. The Netherlands, on the other hand takes a long-range view and considers that fish protection should be increased because many species of fish that have no commercial value at present may be of value in the future.

Swedish fishermen are probably generally of the opinion that whiting in particular needs all the protection it can get if it is not to be exterminated. There has been a marked reduction of whiting catches in the North Sea as well as the Skagerrack and the Kattegat during the last few years, and at present whiting is very scarce.

According to the editor, the executives of the Swedish West Coast Fishermen's Central Association met some time ago and unanimously recommended that at the impending meeting of the Permanent Commission the Swedish delegates should resist emphatically any weakening of the protection afforded whiting and sand dab.

NORTH PACIFIC FUR SEAL COMMISSION

FUR SEAL CONSERVATION CONVENTION SIGNED: The North Pacific Fur Seal Conference came to a successful close on February 9 in Washington with the signing of the Interim Convention for the Conservation of North Pacific Fur Seal Herds. The Convention is the result of extensive negotiations by delegations of Canada, Japan, the Union of Soviet Socialist Republics, and the United States of America, which began discussions on November 28, 1955.

There are about 1,600,000 fur seals in the North Pacific Ocean. Indiscriminate killing of seals would soon reduce their numbers sharply and perhaps jeopardize their existence. This was demonstrated in the late nineteenth century when the herds



whose numbers in the 1860's had reached almost 2,000,000, fell to about 200,000 head in 1911 due to indiscriminate slaughter. Under the four-power Fur Seal Convention of 1911, Canada, Japan, Russia, and the United States prohibited their nationals from hunting the seals at sea. As a result, the populations rose to 1,600,000 by 1941 when the 1911 Convention was terminated. Meanwhile, during this 30-year period over a million skins were harvested on the breeding islands by the Governments having control of them. The present convention will re-institute multilateral conservation by the four North Pacific powers.

The fur seal spends nine months each year at sea, three months on land. Migrating each winter to waters as far south as the latitude of San Francisco and Tokyo, the herds beginning in June return to three island groups in the far north--the Pribilof Islands off Alaska and the Commander Islands and Robben Island off the

Asian Coast. Here they remain for three months on the shingle beaches while the pups are born and are prepared for life at sea, even having to learn to swim during this time. In September the seals begin to leave for their nine-month journey southward.

The seal is a polygamous creature. One bull may have a harem of as many as 50 females. For the needs of the fur industry the practice has, therefore, been to take the surplus males. Usually three-year old males are taken, the peltage being then at its prime. The killing is done on the Asian islands by the Government of the U.S.S.R. and on the Pribilof Islands by the United States Government.

The Convention provides among other things for:

1. the establishment of a North Pacific Fur Seal Commission of four members, one from each of the Signatories;
2. a six-year cooperative research program;
3. the prohibition of pelagic sealing (seal hunting at sea), except to a specified extent for research purposes;
4. boarding and search of vessels at sea in suspicious circumstances and arrest of vessels and crews upon reasonable belief of seal hunting with trial in the country of the flag of the vessel.
5. the enactment and enforcement by the Parties of such legislation and the application of such measures as may be necessary to guarantee the observance of the Convention; and

6. a sharing of the land kill so that Canada and Japan receive each year from the U.S.S.R. and the U.S.A. 15 percent of the seal-skins taken on the islands by the latter two Governments.

The Convention will enter into effect upon the deposit of ratifications in Washington by the four Signatories. It will continue in effect for six years although in certain circumstances the term may vary from six years. The Parties agree to hold a meeting toward the close of the research program to determine what more permanent arrangements may be necessary for the conservation of the herds.

The text of the convention follows:

INTERIM CONVENTION ON CONSERVATION OF NORTH PACIFIC FUR SEALS

The Governments of Canada, Japan, the Union of Soviet Socialist Republics, and the United States of America,

Desiring to take effective measures towards achieving the maximum sustainable productivity of the fur seal resources of the North Pacific Ocean so that the fur seal populations can be brought to and maintained at the levels which will provide the greatest harvest year after year, with due regard to their relation to the productivity of other living marine resources of the area,

Recognizing that in order to determine such measures it is necessary to conduct adequate scientific research on the said resources, and

Desiring to provide for international cooperation in achieving these objectives,

Agree as follows:

ARTICLE I

1. The term "pelagic sealing" is hereby defined for the purposes of this Convention as meaning the killing, taking, or hunting in any manner whatsoever of fur seals at sea.

2. The words "each year", "annual" and "annually" as used hereinafter refer to Convention year, that is, the year beginning on the date of entry into force of the Convention.

3. Nothing in this Convention shall be deemed to affect in any way the position of the Parties in regard to the limits of territorial waters or to the jurisdiction over fisheries.

ARTICLE II

1. In order to realize the objectives of this Convention, the Parties agree to coordinate necessary scientific research programs and to cooperate in investigating the fur seal resources of the North Pacific Ocean to determine:

(a) what measures may be necessary to make possible the maximum sustainable productivity of the fur seal resources so that the fur seal populations can be brought to and maintained at the levels which will provide the greatest harvest year after year; and

(b) what the relationship is between fur seals and other living marine resources and whether fur seals have detrimental effects on other living marine resources substantially exploited by any of the Parties and, if so, to what extent.

2. The research referred to in the preceding paragraph shall include studies of the following subjects:

(a) size of each fur seal herd and its age and sex composition;

(b) natural mortality of the different age groups and recruitment of young to each age or size class at present and subsequent population levels;

(c) with regard to each of the herds, the effect upon the magnitude of recruitment of variations in the size and the age and sex composition of the annual kill;

(d) migration routes of fur seals and their wintering areas;

(e) numbers of seals from each herd found on the migration routes and in wintering areas and their ages and sexes;

(f) extent to which the food habits of fur seals affect commercial fish catches and the damage fur seals inflict on fishing gear; and

(g) other subjects involved in achieving the objectives of the Convention, as determined by the Commission established under Article V, paragraph 1.

3. In furtherance of the research referred to in this Article, each of the Parties agrees to carry out, each year after the entry into force of the Convention, the programs set forth in the Schedule annexed to the Convention with any modifications thereof made pursuant to Article V, paragraph 3. The said Schedule, together with any such modifications, shall be considered an integral part of this Convention.

4. Each Party agrees to provide the Commission annually with information on:

(a) number of black pups tagged for each breeding area;

(b) number of fur seals, by sex and estimated age, taken at sea and on each breeding area; and

(c) tagged seals recovered on land and at sea; and, so far as is practicable, other information pertinent to scientific research which the Commission may request.

5. The Parties further agree to provide for the exchange of scientific personnel; each such exchange shall be subject to mutual consent of the Parties directly concerned.

6. The Parties agree to use for the scientific pelagic research provided for in this Article only government-owned or government-chartered vessels operating under strict control of their respective authorities. Each Party shall communicate to the other Parties the names and descriptions of vessels which are to be used for pelagic research.

ARTICLE III

In order to realize the purposes of the Convention, including the carrying out of the coordinated and cooperative research, each Party agrees to prohibit pelagic sealing, except as provided in Article II, paragraph 3 and the Schedule, in the Pacific Ocean north of the 30th parallel

of north latitude including the seas of Bering, Okhotsk, and Japan by any person or vessel subject to its jurisdiction.

ARTICLE IV

1. Each Party shall bear the expense of its own research. Title to sealskins taken during the research shall vest in the Party conducting such research.

2. If the total number of seals of the Commander Islands breeding grounds decreases and falls below 50,000 head, according to data in official records, then commercial killing of seals and apportionment of skins may be suspended by the Union of Soviet Socialist Republics until the number of seals exceeds 50,000 head. This provision also applies to the fur seal herd of Robben Island, if the population of that herd becomes less than 50,000 head.

3. The Government of the Union of Soviet Socialist Republics upon suspending such sealing shall so inform the other Parties. In this case the Commission shall determine whether or not to reduce the level of or to suspend completely the pelagic sealing for scientific purposes in the Western Pacific Ocean during the period of the said suspension.

4. The Commission may, subsequent to the second year of operation of the Convention, modify the floor figure set forth in paragraph 2 of this Article in accordance with its findings based upon scientific data received by it; and if any such modifications are made, paragraph 2 of this Article shall be considered amended accordingly. The Commission shall notify each Party of every such amendment and of the effective date thereof.

ARTICLE V

1. The Parties agree to establish the North Pacific Fur Seal Commission to be composed of one member from each Party.

2. The duties of the Commission shall be to:

(a) formulate and coordinate research programs designed to achieve the objectives set forth in Article II, paragraph 1;

(b) recommend these coordinated research programs to the respective Parties for implementation;

(c) study the data obtained from the implementation of such coordinated research programs;

(d) recommend appropriate measures to the Parties on the basis of the findings obtained from the implementation of such coordinated research programs, including measures regarding the size and the sex and age composition of the seasonal commercial kill from a herd; and

(e) recommend to the Parties at the end of the fifth year after entry into force of this Convention and, if the Convention is continued under the provisions of Article XIII, paragraph 4, at a later year, the methods of sealing best suited to achieve the objectives of this Convention; the above-mentioned later year shall be fixed by the Parties at the meeting early in the sixth year provided for in Article XI.

ARTICLE VI

In order to implement the provisions of Article III, the Parties agree as follows:

1. When a duly authorized official of any of the Parties has reasonable cause to believe that any vessel outfitted for the harvesting of living marine resources and subject to the jurisdiction of any of the Parties is offending against the prohibition of pelagic sealing as provided for by Article III, he may, except within the

territorial waters of another State, board and search such vessel. Such official shall carry a special certificate issued by the competent authorities of his Government and drawn up in the English, Japanese, and Russian languages which shall be exhibited to the master of the vessel upon request.

2. When the official after searching a vessel continues to have reasonable cause to believe that the vessel or any person on board thereof is offending against the prohibition, he may seize or arrest such vessel or person. In that case, the Party to which the official belongs shall as soon as possible notify the Party having jurisdiction over the vessel or person of such arrest or seizure and shall deliver the vessel or person as promptly as practicable to the authorized officials of the Party having jurisdiction over the vessel or person at a place to be agreed upon by both Parties; provided, however, that when the Party receiving notification cannot immediately accept delivery of the vessel or person, the Party which gives such notification may, upon request of the other Party, keep the vessel or person under surveillance within its own territory, under the conditions agreed upon by both Parties.

3. The authorities of the Party to which such person or vessel belongs alone shall have jurisdiction to try any case arising under Article III and this Article and to impose penalties in connection therewith.

4. The witnesses or their testimony and other proofs necessary to establish the offense, so far as they are under the control of any of the Parties, shall be furnished with all reasonable promptness to the authorities of the Party having jurisdiction to try the case.

5. Sealskins discovered on seized vessels shall be subject to confiscation on the decision of the court or other authorities of the Party under whose jurisdiction the trial of a case takes place.

6. Full details of punitive measures applied to offenders against the prohibition shall be communicated to the other Parties not later than three months after the application of the penalty.

ARTICLE VII

The provisions of this Convention shall not apply to Indians, Ainos, Aleuts, or Eskimos dwelling on the coast of the waters mentioned in Article III, who carry on pelagic sealing in canoes not transported by or used in connection with other vessels, and propelled entirely by oars, paddles, or sails, and manned by not more than five persons each, in the way hitherto practiced and without the use of firearms; provided that such hunters are not in the employment of other persons or under contract to deliver the skins to any person.

ARTICLE VIII

1. Each Party agrees that no person or vessel shall be permitted to use any of its ports or harbors or any part of its territory for any purpose designed to violate the prohibition set forth in Article III.

2. Each Party also agrees to prohibit the importation and delivery into and the traffic within its territories of skins of fur seals taken in the area of the North Pacific Ocean mentioned in Article III, except only those taken by the Union of Soviet Socialist Republics or the United States of America on rookeries, those taken at sea for research purposes in accordance with the Schedule, those taken under the provisions of Article VII, those confiscated under the provisions of Article VI, paragraph 5, and those inadvertently captured which are taken possession of by a Party; provided, however, that all such excepted skins shall be officially marked and duly certified by the authorities of the Party concerned.

ARTICLE IX

1. The respective Parties agree that, of the total number of sealskins taken commercially each season on land, there shall at the end of the season be delivered a percentage of the gross in number and value thereof as follows:

By the Union of Soviet

Socialist Republics { to Canada . . . 15 per cent
to Japan . . . 15 per cent

By the United States of

America . . . { to Canada . . . 15 per cent
to Japan . . . 15 per cent

2. Each Party agrees to deliver such sealskins to an authorized agent of the recipient Party at the place of taking, or at some other place mutually agreed upon by such Parties.

3. In order more equitably to divide the direct and indirect costs of pelagic research in the Western Pacific Ocean, it is agreed:

(a) that in any year in which commercial killing is carried out for both the Commander and Robben Islands herds and pelagic research in that area is carried on at a level of 2,000 or more seals:

(1) Canada and Japan will forego the delivery of the sealskins by the Union of Soviet Socialist Republics as set forth in paragraph 1 of this Article; and

(2) the United States of America will increase its delivery to Canada and Japan as set forth in paragraph 1 of this Article by a total of 375 sealskins to each of these Parties;

(b) that in any year in which commercial killing is carried out for one only of the Commander or Robben Islands herds and pelagic research in that area is carried on at a level of 1,000 or more seals:

(1) Canada and Japan will forego the delivery of the sealskins by the Union of Soviet Socialist Republics as set forth in paragraph 1 of this Article; and

(2) the United States of America will increase its delivery to Canada and Japan as set forth in paragraph 1 of this Article by a total of 188 sealskins to each of these Parties.

ARTICLE X

1. Each Party agrees to enact and enforce such legislation as may be necessary to guarantee the observance of this Convention and to make effective its provisions with appropriate penalties for violation thereof.

2. The Parties further agree to cooperate with each other in taking such measures as may be appropriate to carry out the purposes of this Convention, including the prohibition of pelagic sealing as provided for by Article III.

3. The Commission may, subsequent to the first year of operation of the Convention, modify in accordance with its scientific findings the research programs set forth in the Schedule and, if any such modifications are made, the Schedule shall be considered amended accordingly. The Commission shall notify each Party of every such amendment and of the effective date thereof.

4. Each Party shall have one vote. Decisions and recommendations shall be made by unanimous vote. With respect to any recommendations regarding the size and the sex and age composition of the seasonal commercial kill from a herd, only those Parties sharing in the sealskins from that herd under the provisions of Article IX, paragraph 1 shall vote.

5. The Commission shall elect from its members a Chairman and other necessary officials and shall adopt rules of procedure for the conduct of its work.

6. The Commission shall hold an annual meeting at such time and place as it may decide. Additional meetings shall be held when requested by two or more members of the Commission. The time and place of the first meeting shall be determined by agreement among the Parties.

7. The expenses of each member of the Commission shall be paid by his own Government. Such joint expenses as may be incurred by the Commission shall be defrayed by the Parties by equal contributions. Each Party shall also contribute to the Commission annually an amount equivalent to the value of the sealskins it confiscates under the provisions of Article VI, paragraph 5.

8. The Commission shall submit an annual report of its activities to the Parties.

9. The Commission may from time to time make recommendations to the Parties on any matter which relates to the fur seal resources or to the administration of the Commission.

ARTICLE XI

The Parties agree to meet early in the sixth year of this Convention and, if the Convention is continued under the provisions of Article XIII, paragraph 4, to meet again at a later year, to consider the recommendations of the Commission made in accordance with Article V, paragraph 2 (c) and to determine what further agreements may be desirable in order to achieve the maximum sustainable productivity of the North Pacific fur seal herds. The above-mentioned later year shall be fixed by the Parties at the meeting early in the sixth year.

ARTICLE XII

Should any Party consider that the obligations of Article II, paragraphs 3, 4, or 5 or any other obligation undertaken by the Parties is not being carried out and notify the other Parties to that effect, all the Parties shall, within three months of the receipt of such notification, meet to consult together on the need for and nature of remedial measures. In the event that such consultation shall not lead to agreement as to the need for and nature of remedial measures, any Party may give written notice to the other Parties of intention to terminate the Convention and, notwithstanding the provisions of Article XIII, paragraph 4, the Convention shall thereupon terminate as to all the Parties nine months from the date of such notice.

ARTICLE XIII

1. This Convention shall be ratified and the instruments of ratification deposited with the Government of the United States of America as soon as practicable.

2. The Government of the United States of America shall notify the other signatory Governments of ratifications deposited.

3. This Convention shall enter into force on the date of the deposit of the fourth instrument of ratification, and upon such entry into force Article IX, paragraphs 1 and 2, shall be deemed to have been operative from June 1, 1956, provided that the Parties shall have, from the date of signing, maintained under their internal law the prohibition and effective prevention of pelagic sealing by all persons and vessels subject to their respective jurisdictions.

4. The present Convention shall continue in force for six years and thereafter until the entry into force of a new or revised fur seal convention between the Parties, or until the expiration of one year after such period of six years, whichever may be the earlier; provided, however, that it may continue in force for a further period if the Parties so decide at the meeting early in the sixth year provided for in Article XI.

5. The original of this Convention shall be deposited with the Government of the United States of America, which shall communicate certified copies thereof to each of the Governments signatory to the Convention.

IN WITNESS WHEREOF the undersigned, being duly authorized by their respective Governments, have signed this Convention.

DONE in Washington this ninth day of February 1957, in the English, Japanese, and Russian languages, each text equally authentic.

For the Government of Canada:

A. D. P. HEENEY

G. R. CLARK

For the Government of Japan:

MASAYUKI TANI

For the Government of the Union of Soviet Socialist Republics:

G. ZAROVIN

For the Government of the United States of America:

WM. C. HERRINGTON

ARNIE J. SUOMELA

SCHEDULE

1. The United States of America each year during the first four years shall tag 50,000 black pups on the Pribilof Islands.

2. The Union of Soviet Socialist Republics each year during the first four years shall tag 25 per cent of the black pups on the Commander Islands and 25 per cent of the black pups on Robben Island.

3. In the event that pelagic sealing should be suspended for one or more years under the provisions of Article IV, paragraph 3, the tagging of black pups shall continue at the mentioned rates for a comparable number of years.

4. The United States of America each year shall take at sea for research purposes in the Eastern Pacific Ocean between 1,250 and 1,750 seals.

5. Canada each year shall take at sea for research purposes in the Eastern Pacific Ocean between 500 and 750 seals.

6. Japan shall take at sea in the Western Pacific Ocean:

(a) annually in the first and second years of pelagic research between 2,750 and 3,250 seals;

(b) annually during the remaining four years of pelagic research between 1,400 and 1,600 seals.

7. The Union of Soviet Socialist Republics shall take at sea in the Western Pacific Ocean:

(a) annually in the first and second years of pelagic research between 750 and 1,250 seals;

(b) annually during the remaining four years of pelagic research between 400 and 600 seals.

TRADE AGREEMENTS

AUSTRALIA AND JAPAN SIGN TRADE AGREEMENT WHICH INCLUDES CANNED FISH: A trade agreement between Australia and Japan was signed early in February 1957, states a February 27, 1957, dispatch from the United States Embassy in London. The agreement will run for five years from November 9, 1956. Among the commodities for which quotas were increased is canned salmon to be imported by Australia from Japan. It was also reported that the new agreement provided for substantial exports from Japan to Australia of canned tuna.

UNITED NATIONS

EXPERTS MEET TO PREPARE FOR CONFERENCE ON LAW OF THE SEA: A group of 10 experts appointed to advise on the preparation of an international conference on the law of the sea completed on March 6 its first series of meetings with the United Nations Secretariat, held since February 25. A second series will be held at the beginning of October 1957.

The conference will be held in March and April 1958 in accordance with a resolution adopted by the General Assembly at its current session. It will examine the law of the sea on the basis of draft articles adopted by the United Nations International Law Commission at its eighth session, and it will embody the results of its work in one or more international conventions or other appropriate instruments. The conference will also study the question of free access of landlocked countries to the sea.

The experts discussed the draft agenda and the draft rules of procedure of the conference, plans for the organization of its work, measures to invite governments to make further provisional comments on the International Law Commission's report and related matters, and the preparation of working documents of a legal, technical, scientific, or economic nature in order to facilitate the work of the conference.



Argentine Republic

WHALING FIRM CEASES OPERATIONS: The only Antarctic whaling firm operated by Argentine interests was expected to go out of business. The Argentine firm will terminate its lease on the factory site (owned by Great Britain) on South Georgia Island. The installations will be sold or abandoned. The President of the Argentine company reports that the company could not operate at a profit due to exchange difficulties (The Fishing News, January 4, 1957).



Austria

CANNED MACKEREL MARKET: The quantity of canned mackerel consumed in Austria is equal to the quantity imported, since no domestic production exists, reports a dispatch (January 22) from the United States Embassy at Vienna.

Annual imports of mackerel from Yugoslavia (50 percent), Denmark (40 percent), and Portugal (10 percent) may be estimated at 170 metric tons.

Although Portuguese brands are most popular because they are packed in olive oil, a high customs duty of 85 gold crowns per 100 kilograms (about 10 U. S. cents a pound) keeps imports from that country at a low level. The customs duty on imports from Yugoslavia and Denmark amounts only to 15 percent ad valorem.

In order to find a ready market in Austria, mackerel must be packed in oil, preferably olive oil, or tomato sauce with oil added. The type of can most popular in Austria is the $\frac{1}{4}$ club, 30 millimeter, Portuguese style. Retail prices for these $4\frac{1}{4}$ -oz. cans range from 4.50-6.00 schillings (17-23 U. S. cents) a can.

Yugoslavia, Denmark, and Portugal, the countries exporting mackerel to Austria, maintain their export trade by catering to local taste with respect to flavor, packing medium, and size of cans.

Austria is not a fish-eating country, and meat is generally preferred. Fish consumption consists largely of cod filets, fresh-water fish, such as carp, pike, and trout, and canned fish such as sardines, tuna, and anchovies.

United States exports of canned mackerel to Austria could only be effected if concessions were made by producers with respect to flavor, packing medium, and size of cans.

Even though canned mackerel in 8-ounce cans in natural brine of Japanese origin costs not more than mackerel of European origin in $4\frac{1}{4}$ -oz. cans, Austrian

importers refuse to import them because they feel that they cannot be sold. The reasons for this refusal are that they are (a) boiled, and (b) packed in natural brine.

NOTE: VALUES CONVERTED AT THE RATE OF 26 AUSTRIAN SCHILLINGS EQUAL US\$1 AND ONE GOLD CROWN EQUALS 6.96 SCHILLINGS.



Bolivia

CANNED MACKEREL MARKET: No canned fish of any type is produced in Bolivia, states a January 23 dispatch from the United States Embassy at La Paz.

Canned fish (primarily sardines and salmon) are consumed to a great extent in Bolivia's mine commissaries. As with all imported food products, the consumption outside of the subsidized commissaries is restricted to the very small high and middle-class income groups. Consumers prefer canned fish (principally salmon, but including mackerel and other fish) packed in brine. The retail price of the 15-oz. tall can, the most popular size, amount to about Bs.4,000 (52 U. S. cents) a can.

While Bolivia does have barter agreements with some neighboring countries, none of these has had more than a negligible share of the canned fish imports. Canada and the United States have been the principal suppliers of canned fish (mostly salmon). In 1955, Bolivia imported 1,222,951 pounds of canned fish (valued at US\$336,591) from the United States as compared with 35,057 pounds (valued at US\$9,331) for 1954. Imports from Canada in 1955 amounted to 46,279 pounds (valued at US\$12,501) as compared with 180,506 pounds (valued at US\$41,893) in 1954.

The majority of canned fish purchases have been for supplying the subsidized mine commissaries, and it is expected that with the new stabilization program put into effect in late December 1956 that the landed cost in Bolivia of such items will be beyond the purchasing power of mine laborers as a whole. It is anticipated that a severe reduction in canned fish and other imported foodstuffs will be experienced in the future. In view of the free trade provisions it is expected that all purchases will be strictly on a price basis and that superior quality will not be a prime factor.

Under the present difficult financial condition of Bolivia there does not appear to be any specific trading scheme which would lead to increased United States export except that of competitive prices. The market for canned fish, as has been previously explained, will probably be reduced even from its present low value in the coming year as the purchasing power of all but a very small segment of Bolivia's population is so low that imported canned foodstuffs will be beyond their reach. United States firms interested in the Bolivian market should refer to the trade list Foods, Importers, and Wholesalers and endeavor to obtain an agent or distributor to represent them in La Paz when the major purchases of foodstuffs are made for the mine commissaries.



Brazil

TUNA LANDED BY JAPANESE FISHING VESSEL: The Japanese fishing vessel Sagami Maru unloaded 100 metric tons of fresh fish of the "tuna family" at Salvador City, Bahia, Brazil, on January 16. The fish was sold at CR\$25.00-30.00 a kilogram (20-25 U. S. cents a pound).

This delivery of fish is the result of an agreement made between the Brazilian Ministry of Agriculture, the Bahia Agricultural Department, and the local price control board.

It is also reported that a privately-owned cold-storage plant for preserving perishable commodities, including fish, is under construction at "Calcada" in Salvador City. Its installations, including buildings, will cost about CR\$50 million (US\$900,000).



Canada

THE FISHING INDUSTRY'S FUTURE: The preliminary report of the Royal Commission on Canada's Economic Prospects (Gordon Commission) predicts that the fishing industry will share, to a modest extent, in the increasing prosperity of Canada during the next 25 years. It emphasizes, however, that the fishing industry must receive the continuing attention of government, and perhaps receive increased assistance. The report recognizes that the United States tariff policies on fish are all important to the Canadian industry. The Commission advocates an adjustment in the Canadian doctrine of territorial waters, according to a February 13 dispatch from the United States Embassy at Ottawa.

The Gordon Commission preliminary report on "The Fishing Industry" characterizes the industry as one with special problems and with an importance exceeding its size. It points out that it is a dominant industry in areas where alternative cash income is not available, and that it is unique in that the resources on which it is based are located largely outside the limits of Canada.

The Commission recommends that Canada should (1) take every opportunity to negotiate the removal of barriers restricting international trade in fish, (2) re-examine Canada's doctrine of territorial waters, and (3) determine at a later date the requirement for government assistance for capital investment in larger fishing vessels and more modern processing plants. By implication a recommendation is made to (4) remove the discrimination against fishing vessels of over 65 feet in length.

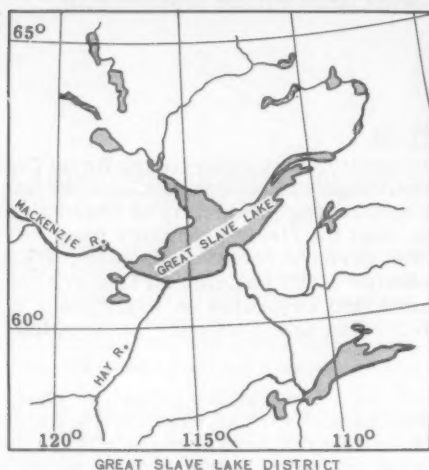
It is the view of the Commission that during the next 25 years there will be (1) increased domestic demand for fish and that the United States will continue to be the most important export market. In this connection it considers any increase in the United States tariff would have a direct and adverse effect on the Canadian industry. (2) Continued biological and technical research are advocated which in turn will lead to a requirement for larger vessels and more costly processing plants requiring larger capital investment. (3) The fishing population of Canada will become smaller by one-sixth and concentrated in fewer centers. (4) There will be an industry production increase of approximately 60 percent due to rising productivity. (5) Incomes in the fishing industry in 1980 will be substantially higher than those of today.

GREAT SLAVE LAKE FISHERY: The Great Slave Lake fishery of Canada has a summer and winter commercial fishing season, reports the November 1956 Trade News of the Department of Fisheries of Canada. The combined whitefish and lake trout fishery of the Great Slave Lake is the largest of its kind in the world.

The story of the Great Slave Lake fishery is dramatically told in the film, "Fishes of the Great Slave." It is the newest addition to the growing file of moving films on Canada's fisheries being compiled by the Department of Fisheries of Canada as a means of portraying the far-reaching influence of this oldest of industries on Canada's social and economic structure.

The film vividly traces the evolution of the fishery from the time that scientists first undertook studies to assess the potentialities of the lake as a producer of fish on a commercial scale, to its present day stage of development.

The lake is fished by nine independent companies, each with its own base camp and fleet of boats. Since the lake is navigable only from June to October, the camps



are set up every summer, and closed at the end of the season. So the fishermen themselves are migrants. A daily trip to the fishing grounds is made. Two-men crews are the general rule for most boats, though some are manned by three and four. Every crew uses personal marker flags to identify its nets.

A gillnet is set in a straight line, usually on or near the bottom, in 30 to 250 feet of water. This net has a 5½-inch mesh, which will allow all small

fish to swim through unharmed, thus helping to conserve the species. Occasionally 200 fish are hauled aboard in one net; 2 to 3 pounds is about the average size for whitefish and the lake trout on record for these waters weighed over 60 pounds. As soon as the net has been lifted the fishermen set it back in approximately the same place before moving on to lift another.

Each fisherman is licensed to operate 10 nets. Often they are set as much as half a day's run from the camp. As a result, some boats may be gone from camp almost from one day's end to the next. When they return it may be any time of the day or night. Back at the camp the boats unload onto a barge, a sort of floating factory, moored to the shore, where the fish are cleaned and dressed. The lake trout and whitefish are sorted into separate boxes as they come out of the ice-packed hold. They have been packed in ice since the moment they were taken from the water.

An average day's catch for two men would amount to about 3,000 pounds. More than 4 million pounds have been taken from the lake in one summer. As soon as they have been cleaned, the fish are once more packed in ice, this time in shipping boxes

in preparation for a journey that may take them across the continent of North America. The journey begins as the boxes are lowered into the refrigerated hold of a freighter that will carry them a hundred or more miles across the lake, an all night voyage over a lake bigger and more treacherous than Lake Erie and in some places deeper than Lake Superior. Eventually the freighter reaches the southern shore and the town of Hay River, where the highway meets the lake. There the boxes of ice-packed fish start on the second stage of their journey. They are loaded from the freighter into refrigerator trucks. Canada's Department of Fisheries keeps records of every shipment.

Table 1 - Great Slave Lake Catches for Past Two Fishing Seasons

Species	Winter 1955/56		Summer 1956	
	Landings	Value	Landings	Value
	1,000 Lbs.	C\$1,000	1,000 Lbs.	C\$1,000
Whitefish	1,830	275	2,245	146
Lake trout	487	68	2,161	159
Other (Inconnu, pike, pickerel)	187	9	107	8
Total	2,504	352	4,513	313

Off down the Mackenzie Highway, the fish of Great Slave Lake still have 3,000 miles to go. By road the boxes of fish reach Grimshaw, Alta. By train they cross

the continent to Chicago, Detroit, and New York--3,000 miles from the chill waters of the Great Slave.

By November the clear blue summer skies are forgotten in the darkening north.

The snowmobile has made commercial fishing on Great Slave Lake a year-round trade. It is equally at home on land and on the frozen lake. Use of the snowmobile and a thorough knowledge of the geography of the lake enables the fishermen to pick a good site.

First of all a hole must be dug through the ice. When the four feet of ice are finally penetrated, the water comes to the fishermen's assistance by carrying the ice chips to the surface where they are easily shovelled off. The next step involves the use of the jigger. This device has the mission of pulling the first line under the ice. While one man jerks on the line to propel the jigger, the other follows the jigger by listening from the surface.

When the jigger has travelled a hundred yards and the fisherman is quite sure that he knows exactly where it is, he digs a second hole through the ice and brings the jigger up. The rope remains stretched under the ice between the two holes, and is then used to pull the net itself under. The net finally comes to rest between the two holes anchored at top and bottom and in that position the men leave it for the span of a day. The next day when the fishermen come back to lift the net the water in the hole has usually frozen over to a depth of four or five inches.

When the fish come out of the water into the extreme cold of the winter air, they would soon freeze if the fishermen do not act quickly. Fresh fish commands a better price than frozen fish. Just as fast as they can be cleaned the fish are loaded into the heated snowmobile for the journey to market.

MIDWATER TRAWL IMPROVED: New improvements have been made in the midwater trawl, adapted for the herring fishery off British Columbia by the Fisheries Research Board of Canada under the Industrial Development Service of the Department of Fisheries.

Two new advantages are claimed for the modified gear. Developments in gear design permit the net to be operated from single-gear trawlers, putting it within the economic range of relatively small-type vessels. A new type of otter board permits trawling both in midwater and on the bottom without damage to the gear.

The Fisheries Research Board said that recent fishing from the chartered boat Phyllis Carlyle, has proved successful in taking herring from midwater depths down to within two fathoms of the sea floor. The man in charge of fishing operations on the Phyllis Carlyle said tests were hampered by an unusual delay in the appearance of herring in the Strait of Georgia in 1956, but that sufficient evidence has been gathered to show that the net can be operated efficiently.

The new midwater trawl is a four-sided net, having an opening of 30 feet at its front end. A combination of aluminum alloy trawl plane floats and newly developed hydroplane floats keeps the net from touching bottom, thus preventing damage from fouling on the sea floor. The new otter doors are also made of aluminum and can operate efficiently both in midwater and for bottom trawling, according to Trade News (December 1956) of the Department of Fisheries of Canada.

NORTHWEST ATLANTIC TRAWL-NET MESH REGULATIONS: Regulations prescribing minimum mesh sizes in the Canadian Northwest Atlantic trawl nets were expected to go into effect when the required Order-in-Council was published in the Canada Gazette about February 13. The regulations apply to nets being used to fish ocean perch exclusively.

The regulations prescribe a minimum mesh size for all parts of the trawl. The parts mainly affected are the cod end, lengthening piece, and the aft part of the belly. Other parts of the trawl usually have larger meshes than those prescribed as a minimum. Mesh regulations are already in effect for subarea 5 (Georges Bank and adjacent waters). The regions affected by the new regulations are subareas 3 and 4. Subarea 4 includes the Bay of Fundy, Nova Scotian waters, and the Gulf of St. Lawrence. Subarea 3 includes the Newfoundland fishing banks.

The minimum mesh size prescribed for subarea 4 is the same as that for subarea 5. For subarea 4, manila netting used in otter trawls must have a mesh size larger than $4\frac{1}{2}$ inches, internal measure, measured wet after use. For subarea 3, the minimum mesh size for manila netting is 4 inches, measured in a like manner. Other materials shrink and stretch to a different degree than manila. They may also allow the escape of different sizes of fish than manila through the same size mesh opening. The necessary equivalents for other materials are thus included in tables, which have been circulated in the industry. Also included in these tables are the recommended mesh sizes of new netting which should meet the minimum mesh size specified (Fisheries Council of Canada Bulletin, January 18, 1957).

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USE OF AUREOMYACIN FOR FISH PRESERVATION HELD UP: In October 1956 when the Canadian Department of National Health and Welfare approved the use of an aureomycin derivative as an aid in the preservation of fish, it was believed that it would delay spoilage and make for a fresher product in the markets. However, since the United States Food and Drug Administration has not approved the use of aureomycin for fish and shellfish, Canadian fishermen have not found it practical to maintain two separate icing procedures: one portion of the catch being iced with aureomycin-treated ice products and the other portion being iced with the non-treated ice. Therefore, these circumstances are retarding the use of aureomycin derivatives to preserve fish in Canada.

Although the Canadians have found that aureomycin-treated ice was harmless when used to preserve fish, the United States authorities have found that fish preserved with treated ice retain residual traces of aureomycin, even after packaging and final cooking.

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, OCTOBER 1956, P. 59.



China (Communist)

FISHERIES PRODUCTION, 1956: Total fisheries production in Communist China in 1956 was 2.55 million metric tons, despite the hurricanes of last summer, the Chinese Minister of Aquatic Products announced on February 11. This was an increase of 30,000 tons over 1955.

A total of 62 modern trawlers were constructed in Communist China in 1956 as against only 20 in 1955. The construction of modern trawlers seems to presage a more active role in offshore fisheries.



Colombia

CANNED MACKEREL MARKET: No canned mackerel or jack mackerel are produced in Colombia, and in the past, only a small amount has been imported from California. The consumption of canned mackerel in Colombia is believed to be nil at the present time, because mackerel is reported to have a strong taste which does not appeal to many South Americans. Consumption in the past was believed to have been confined to foreigners, particularly Europeans, who have acquired a taste for this type of fish. The most popular size of can formerly used was the 15-oz. oval, packed in tomato sauce. The retail price for canned mackerel early in 1956 was Ps\$2-2.50 (50-63 U. S. cents) a can.

The quantity and value of canned mackerel imported into Colombia is not available because official import statistics do not show a breakdown by types of fish. These statistics include sardines and other types of fish in "hermetically-sealed containers." The principal countries of origin for canned sardines and fish of all types were the United States, Portugal, Spain, Canada, Japan, and the United Kingdom.

By Decree No. 2643 of November 2, 1956, the Colombian Government placed all canned fish on the Prohibited List of Imports. Therefore, the exportation of this commodity to Colombia is not feasible at the present time, since no import licenses are issued for items on the Prohibited List. However, as the domestic production of canned fish is known to be inadequate to meet the demand of the Colombian market, it is believed that this commodity will shortly be taken off the Prohibited List and that a limited number of licenses will be issued to local importers, according to a January 31 dispatch from the United States Embassy at Bogota.

A strong advertising campaign, made through local newspapers and magazines, emphasizing the low cost and high protein content of canned mackerel, might lead to an increase of United States exports to Colombia. Also, considering that the local fish-canning industries have been given full Customs Tariff protection, United States trade sources might consider the possibility of establishing such canneries in Colombia, or, of making capital investments in the local canneries now in operation, in order to obtain a larger share of the Colombian market for canned fish.



Ecuador

SHRIMP FISHING AND PROCESSING INDUSTRY: Although the shrimp fishing industry of Ecuador is small, prospects for future expansion are good. The manager of the United States-owned shrimp fishing and processing company in that country estimates the catch at 1.8 million pounds of headless blue-white shrimp (8-15 count a pound heads-on) and about 400,000 pounds of heads-on sea bob (35-50 count heads-on) annually. The large blue-white shrimp are similar to the shrimp taken in the Gulf of Panama and off the west coast of Mexico. The sea bob shrimp is used locally, but most of the blue-white shrimp is processed, packed, and frozen for export to the United States.

Shrimp fishing craft early in 1956 included 20 modern-type shrimp trawlers and 6 smaller poorly-equipped vessels. Nets with 1.5-inch mesh or larger are used. About 100 fishermen are employed in the shrimp fishery. Processing facilities consist of a small freezer and cold-storage plant at Quayaquil, with a freezing capacity of 10,000 pounds a day and a storage capacity of about 40,000 pounds. A larger freezer with a 20,000-pound daily freezing capacity and a storage capacity of 125,000 pounds is in the planning stage. This project may also include a small cannery. In addition to the above facilities, a floating freezing plant with a freezing

capacity of 20,000 pounds a day and a storage capacity of 130,000 pounds was operating in the Esmeraldas and the Gulf of Quayaquil (the principal fishing ground). An additional shrimp freezership is reported to have entered the shrimp fishery about April 1956.

The shrimp fishing areas are located in the Gulf of Quayaquil, about 50 miles from the Quayaquil, and off the northern part of the Ecuadorian coast between Esmeraldas and Cabo Manglares. The shrimp fishing seasons are not well defined, but the period between March and October is believed to be the most productive.

In order to increase the shrimp catch, additional capital is needed for fishing docks and machineshop facilities. Fresh-water supplies along the coast are limited and ice plants are not available within easy operating range of the shrimp vessels. Ice is plentiful in Quayaquil, about 50 miles from the Guayaquil Gulf fishing area. There are no docking facilities in the two fishing areas.

Prices are variable and are estimated to average about 45 U. S. cents a pound ex-vessel. Processing costs for washing, grading, packing, freezing, and storage average 13-15 U. S. cents a pound, and other charges for taxes and export duty about 2 cents a pound. The cost for ocean transport, insurance, customs clearances, and cartage into a United States warehouse is estimated at about 8 cents a pound. (United States Embassy dispatch from Quito, dated April 16, 1956.)

The imports of shrimp by the United States from Ecuador amounted to about 1.6 million pounds in 1955 and 3.0 million pounds in 1956. Comparing the imports with the average annual landings of 1.8 million pounds of blue-white shrimp leads to the conclusion that the shrimp fishery of Ecuador is expanding at a fairly rapid rate.



France

FISHING INDUSTRY DEVELOPMENTS: A special Committee has been set up by the French Government to study the structure of the whole fishing industry. It is hoped that some concrete suggestions will emerge including one concerning the vexing minimum net mesh question. The French want a much smaller mesh than other European countries.

The Central Fishing Committee has asked that not over 50 tons of Iceland fish a week should be sold at Boulogne. It is pointed out that the port has made tremendous efforts to refloat its industry which was almost destroyed during the war. While it has no objection to some imports, it is against uncontrolled imports from Iceland.

The French Government has agreed to make a grant of about US\$1.4 million for the construction of a special research trawler to be placed at the disposal of the French Fishing Institute, the fishery periodical World Fishing of January 1957 states.



French West Africa

TUNA FISHING INDUSTRY: Number and Types of Vessels: During the tuna fishing season which started in the middle of November 1956 and will end probably in May 1957, 43 vessels were fishing, using Dakar harbor as their base. This fleet

is composed of 22 "baby clippers" from the St. Jean-de-Luz area (Basque coast of France), 19 trawlers adapted to tuna fishing from Brittany, and one large tuna clipper permanently based in Dakar harbor. This latter vessel, owned by a Frenchman, was brought to Dakar last year under the Honduran flag and has since been "naturalized" French. The owner of this tuna clipper is reported to have purchased a second such vessel from Peru and intends bringing it to Dakar. Fishing is done with rods, using live bait (sardinelle).

Landings: For the period of mid-November to December 31, 1956, approximately 2,000 metric tons of tuna were caught. Only one type of tuna is being fished, namely the albacore tuna or locally known as yellow-finned tuna (*Neothunus albacora*). The rather exceptionally cool weather conditions presently prevailing in the Dakar region have caused the tuna to swim further south than is normal in this season and also to swim deeper, thereby seriously affecting the fishermen's success, which was considered to be disappointing in comparison with last year.

Disposition of Catch: The whole catch is reserved for French Metropolitan canneries to which the fishing fleet and supporting vessels are chartered. With the exception of the one tuna clipper, the fishing vessels have no refrigerating equipment. As soon as they return to Dakar with their load they transfer it to a ship especially equipped for quick-freezing brought over from France under charter to French canneries. When the fish is frozen (whole), it is again transferred to one of four refrigerator ships (also operating under the same charter) for transport to France. The presence of such a ship equipped for quick-freezing was reportedly necessary since even the recently expanded refrigerating facilities at the port of Dakar were not considered sufficient during the fishing season.

Value of Catch: Since practically the whole catch is destined to Metropolitan France and since the season is not yet completed, it is difficult to determine exactly the value of the catch. The price delivered to Dakar is estimated at about US\$264 a ton.

Future Plans: Although this season's catch has not yet appeared to meet the high expectations formulated last year, the general belief is that tuna fishing along the western coast of Africa would be a very worthwhile activity and that serious thought must be given to the establishment of a local cannery industry there. Two pilot plants are already functioning, but the decision to firmly establish a fish cannery industry depends on a number of important factors. (United States consular dispatch dated January 24 from Dakar.)



Iceland

FISHERIES TRENDS, DECEMBER 1956: The principal fishing season began early in December without delay, according to a dispatch (January 11, 1957) from the United States Embassy at Reykjavik. Sales of fresh fish on ice to the United Kingdom were encouraging.

The agreement on the production basis for the fisheries reached in December 1956 permitted the main fishing season for groundfish to get under way without delay and most of the trawlers and motorboats were active at that time. Because of the lifting of the British landing ban in the fall of 1956 and the continuation of the good Faxa Bay herring catches into December, there was almost no suspension of activity between the fall and winter seasons. Most trawlers and motorboats alike fished until the lay-up for Christmas or to refit for the January groundfish season.

The press and trawler owners continued to be optimistic over the progress of sales of fresh fish at good prices to England. The quota for landings at English ports in January was filled before the 11th of the month. Prices continue to range from 2-3 times those received in Iceland.

For the first time in some years the trawlers are having little difficulty in finding qualified seamen. The iced-fish trade mitigates the seaman's hard life considerably by permitting him either several days of shore leave in Iceland while the ship is making the trip to England or relatively easy shipboard duty during the voyage.

The motorboat fleet, on the contrary, still needs as many imported Faroese seamen as last year, and perhaps a few more. Two ships have already stopped at the Faeroes to pick up seamen and the total brought in is expected to be over 900.



Italy

CANNED TUNA IMPORTS, 1954-55: During 1954 and 1955, Italy's imports of canned tuna averaged about 7,736 metric tons, according to a December 20, 1956, dispatch from the United States Embassy in Rome.

Table 1 - Italy's Imports of Canned Tuna in 1954 and 1955 by Country of Origin

Country	1955	1954
...	... (Metric Tons) ...	
Portugal	2,459.5	3,550.9
Spain	1,742.6	1,256.6
Spanish Morocco	1,593.1	1,200.2
Libia	392.7	640.8
W. Equatorial Africa	-	-
Spanish Africa	461.0	548.6
United Kingdom	0.2	-
United States	-	0.1
Others	786.1	839.4
Total	7,435.2	8,036.6

Italian imports of canned tuna range from 7,000 to 8,000 metric tons a year (see table).

Tall cans of approximately 5 and 10 kilos (11-22 pounds) are the sizes most commonly used inasmuch as the tuna is chiefly sold in retail stores by "etti" (about 3.5 ounces), two etti or even one-half etto is the quantity generally requested by Italian consumers.

Cans of 7-8 ounces are also available in the market but they are not preferred because of the expense and have, therefore, little importance in the over-all market.

In respect to the importation of fresh and frozen tuna, no official statistics are available. About 11,000 metric tons of canned tuna is estimated to have been produced in 1955 by the Italian canning industry, of which about 10,000 tons were obtained from 14,000 metric tons of imported frozen tuna and approximately 1,000 tons from the domestic catch.

There is very little interest about possible imports of canned tuna from the United States due to the present Italian import restrictions for this item from the dollar area.



Japan

BRITISH WHALING FLEET PURCHASE DISAPPROVED: The proposed purchase of the British whaling fleet (consisting of the Southern Venturer fleet) by a Japanese whaling firm has not been approved by the Japanese Fisheries Agency. The reason given for the refusal was reported to be due to possible adverse reactions by other whaling nations. The Japanese whaling fleets have been increased in the past year by the purchase of the Olympic Challenger fleet, formerly owned by a Greek shipowner, and the Abraham Larsen fleet, formerly owned by a firm in South Africa.

Another Japanese whaling firm has been negotiating for the purchase of whaling craft for sperm whaling in the Okhotsk Sea. This firm was reported to have entered into negotiations with a French firm for the purchase of a whaling factoryship registered in Panama. Later reports stated the negotiations had been fruitless and the firm is now considering purchasing a ship in Japan (United States Embassy dispatch from Tokyo).

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CANNED CRAB MEAT PACK, 1956: The Japanese pack of king crab and kegani crab meat for 1956 (preliminary) amounted to 793,350 cases as compared with 767,906 cases (including king, hanasaki, red, kegani, and other crab meat) for 1955, according to a February 25, 1957, dispatch from the United States Embassy in Tokyo.

Exports of Japanese crab meat during 1956 (preliminary) totaled 574,000 cases as compared with 457,483 cases for 1955. Of these totals, 253,000 cases were shipped to the United States in 1956 and 230,824 cases in 1955.

There were no Government export check prices on crab meat during 1956. However, an organization established by crab meat producers, whose responsibility it is to sell all Japanese crab meat to exporters, established the following export prices for Japanese crab meat which were charged by exporters during 1956: king crab meat US\$24.65 f.o.b. Japan a standard case; and kegani crab meat US\$12.65 f.o.b. Japan a standard case.

Table 1 - Japanese Canned Crab Meat Pack		
Product	1956	1955
	(Standard Cases ^{1/})	
<u>King crab meat:</u>		
Eastern Bering Sea (Bristol Bay)	59,850	2/ 62,421
Western Bering Sea (Off Cape Olyutorskoe)	54,500	-
Okhotsk Sea	313,000	147,000
Off Hokkaido	70,000	124,603
Total	497,350	334,024
<u>Kegani crab meat:</u>		
Off Hokkaido	301,000	339,772
<u>Other crab meat:</u>		
Japan Sea	3/	93,510
Grand Total	798,350	767,306
1/ STANDARD CASE CONSISTS OF 48 6 1/2-OZ. CANS.		
2/ INCLUDES 2,571 CASES OF RED CRAB MEAT.		
3/ FIGURES NOT AVAILABLE.		

Members of the crab meat industry in Japan are very guarded in their opinions concerning the outlook for 1957. Discussions between Japan and the Soviet Union concerning fishing operations in the area covered by the Soviet-Japanese Fisheries Convention are now under way and the outcome of these discussions may have an important bearing upon Japanese crabbing operations during 1957, since most of the Japanese crab catch is taken within the convention area. The Japanese do not expect a quota to be placed upon the crab in the convention area but there is a strong possibility that there will be some restrictions placed upon the type and amount of gear that can be used as well as a designation of the allowable female/male ratio per haul.

The Japanese industry expects to send one fleet to the Eastern Bering Sea (Bristol Bay) as usual and four fleets will probably be sent to the Okhotsk Sea as was done last year, if no catch restrictions are imposed as a result of the current Soviet-Japanese discussions. There is some speculation as to whether the fleet which operated in the Western Bering Sea, off Cape Olyutorskoe, will again operate in this area this year. Operators of the fleet complained that the catch last year, which was the first year of operation in this area, was very poor and that they would prefer to operate in the Okhotsk Sea during the coming season.

It is generally expected that if there are no restrictions on the catch and if the gear limitations are not excessively restrictive, the catch of king crab for 1957 will be approximately the same as during 1956. Of course if stringent restrictions are imposed upon Japanese operations, the catch will be smaller. Members of the industry expressed some pessimism over the 1957 kegan crab prospects and most observers agree that the catch will probably be below the 1956 level.

EXPORTS OF FISHERY PRODUCTS UP IN 1956: While the quantity of Japanese exports of fish and fish products rose 26.6 percent from 1955 to 1956, the value of those exports rose 59.5 percent. Total fish and fish products exports in 1956 amounted to 196,363 metric tons (valued at US\$120.6 million) as compared with 155,108 metric tons (valued at US\$75.6 million) in 1955, according to the Japanese Ministry of Finance and as reported by the United States Embassy in Tokyo in a February 12 dispatch.



Mexico

CANNED SARDINE MARKET: Four canneries, all located in or near Ensenada, Baja California, pack California sardines for consumption within Mexico. Estimated production runs about 250,000 cases annually. In addition, two small canneries in Veracruz pack Spanish mackerel and tarpon under the label of sardines, but this production is insignificant.

Local production accounts for almost all the sardines consumed within Mexico. Since 1951 exports of sardines from Mexico have been insignificant, averaging less than one-half ton a year.

Mexican consumption of sardines is estimated to be about 260,000 standard cases annually. Of this amount, about 95 percent is produced locally and 5 percent is imported. The imported pack is almost entirely from Europe and consists of sardines in olive oil. The local pack is divided about equally between tomato sauce and natural pack.

Current consumption is towards the locally-produced pack. Government policy encourages this trend. Imported sardines carry a duty of about 20 U. S. cents a pound. The Mexican pack, either natural or in tomato sauce, retails for about 2.70 pesos (22 U. S. cents) for a one-pound can. Imported 6½-oz. Spanish sardines in olive oil retail at between 7.75-9.50 pesos (62-76 cents) a can, or approximately US\$1.57-2.00 a pound.

It is not likely that any appreciable amounts of Maine sardines can be imported from the United States, a January 15, 1957, dispatch from the United States Embassy in Mexico City states. The Mexican import duty forces the retail price into the luxury category where historically the consumer preference has been for an olive-oil pack.

The Mexican pack is put up in four types of cans: one-pound oval and tall, one-half pound tall, and five-ounce tall. The imported pack is mostly 3½ to 5 oz. flat with a small amount of 6¼ and 11 oz. flats.

Slightly more than one-half of the Mexican pack is put up in tomato sauce in one-pound ovals. The remainder of the Mexican pack is natural in five-ounce, eight-ounce, and one-pound tall cans. The imported pack is almost exclusively in olive oil, although very small amounts of sardines in mustard and tomato sauce are imported. The preference for style of pack is estimated to be: tomato sauce, 50 percent; natural, 45 percent; and olive oil, 5 percent.

The consumption of sardines in Mexico is limited practically to the middle and high income groups. Prices of canned goods, in general, are too high for the low income group. Estimates of sardine consumption by income groups are: high, 10 percent; middle, 89 percent; low, 1 percent.

The bulk of the Mexican sardine production is handled by two distributors in the Federal District who supply local retail stores and secondary distributors in the outlying territories. The sardines are customarily transported from Ensenada to Acapulco by boat and then by truck to Mexico City. Sardines are usually imported in relatively small amounts by a large number of distributors who sell either directly to retailers or to secondary distributors.

SHRIMP FISHERY TRENDS, FEBRUARY 1957: The Mexican shrimp catch during February is estimated to be down about 2 million pounds from the same month in 1956. The west coast catch is running about 50 percent of last year's catch and that from the east coast is higher than a year ago.

The closed season for shrimp fishing on the west coast from Mayarit north began on March 16 to last one or two months, depending on the spawning conditions of the shrimp. During this period Mexican west coast shrimp fishing will be confined to shrimp grounds off Salina Cruz in the Province of Oaxaca. The shrimp grounds off the east coast are open the year around.

There are about 60 shrimp trawlers under construction in shipyards on Mexico's east coast, states a March 11 dispatch from the U. S. Fisheries Regional Attache in Mexico.



Norway

1957 WINTER HERRING SEASON A FAILURE: The winter herring fisheries off Norway's west coast were a failure this year, especially when compared with the record catch in 1956. At the end of the season (mid-February) fishermen had landed only about 560,000 metric tons of mature herring, with a first-hand value of some Kr. 131.5 million (US\$18.4 million). This season's catch was 300,000 tons less than last year, and the difference in first-hand value is estimated at Kr. 70 million (US\$9.5 million), a heavy loss for the fishermen. The fleet this season suffered heavy losses of gear as a result of strong winds on the fishing grounds.

The spring herring fisheries season which officially opened February 15, is also off to a poor start, despite rather fair weather conditions. During the first five days, only 50,000 tons were landed. On top of the poor catch, fishermen get lower prices for spring herring. After the spawning is over in mid-February, the herring become leaner and less desirable than before.

The failure of the winter herring fisheries cut deliveries to reduction plants to 390,000 tons, as against 800,000 tons in 1956. The salted herring production is also substantially below the 1956 figure. The herring transport fleet, too, has been hard hit. Many vessels stayed in port 5-6 weeks without getting a single cargo.

The main fishing season for large herring ends about the middle of February.



Pakistan

NYLON NETS HELP FISHERMEN: Nylon yarn supplied to West Pakistan fishermen by the Pakistan Central Fisheries Department for knitting nets has helped to increase their fish catch. The fishermen became aware of the value of nylon netting during World War II when surplus parachute nylon fiber was used in nets. Some excellent hauls by Karachi fishermen has aroused considerable enthusiasm on the part of the fishermen for nylon nets.

With the help of the commodity aid agreement between Pakistan and the United States, officials of the Pakistan Central Fisheries Department distributed US\$100,000 worth of nylon to the fishermen in 1956. Under the agreement, the United States undertook to supply the necessary foreign exchange which was lacking, for importing consumer goods or industrial raw materials, which included nylon for fishing purposes. Government officials estimate that about 1,000 fishermen have benefited from the sale of nylon. Since the supply was limited, distribution was restricted to the most deserving fishermen.

The fishermen have learned that while cotton nets last only about six months, nylon nets are good for at least three years. In addition, nylon nets are tougher and can handle bulky catches without breaking. Therefore, nylon netting in spite of the higher cost a square yard is really more economical in the long run.

As part of the commodity aid agreement between the United States and Pakistan, the nylon netting was sold to the fishermen at cost and is to be repaid in long-term installments. The money realized from the sale of the netting is to be placed in a special fund to be used for furthering the development program of Pakistan. (*Pakistan Affairs*, September 16, 1956.)



Portugal

CANNED FISH TRENDS, JUNE-DECEMBER 1956: Fish canning in northern Portugal improved toward the end of 1956 when catches were more abundant.

Early in the 1956 fish packing season, due to a scarcity of fish, prospects were far from bright; but from September onwards, catches became more abundant, the plants were fully occupied, and an easy outlet at remunerative prices was invariably found.

According to published statistics, canned fish exports for the first eleven months of 1956 declined by about 20 percent in quantity but only by about 8 percent in value. The natural inference is that although prices increased, industrial activity must have suffered considerably. The latter aspect, however, will probably show up differently when figures for the complete year are obtainable. Sardine canning is a seasonal occupation, which roughly coincides with the second half of the year. The principal decline in exports took place in the early part of 1956, during the "close"

of the season, owing to the low stocks left over from the 1955 packing season. At present, stocks held by packers are only moderate and prices remain firm, reports a February 12 dispatch from the United States Embassy in Lisbon.

The industry appears to be in fair financial condition, and 1956 may well rank as one of its good trading years.

CANNED FISH EXPORTS, JANUARY-SEPTEMBER 1956: For the first nine months of 1956, canned fish exports amounted to 29,255 tons (1,539,300 cases), valued at US\$17.0 million, as compared with 42,769 tons, valued at \$21.7 million, for the same period in 1955. Sardines in olive oil exported during the first nine months of 1956 were down 12,679 tons from the similar period in 1955.

Species	1956	
	January-September	
	Metric Tons	US\$
Sardines in olive oil	21,283	11,451
Sardinelike fish in olive oil	3,060	2,580
Sardines & sardinelike fish in brine	711	149
Tuna & tunalike in olive oil	1,373	1,111
Tuna & tunalike in brine	279	163
Mackerel in olive oil	2,173	1,331
Other fish	376	186
Total	29,255	16,971

For January-September 1956, the leading canned fish buyer was Germany with 4,734 tons (valued at US\$2.6 million), followed by the United Kingdom with 4,241 tons (valued at US\$2.3 million),

Italy with 3,942 tons (valued at US\$2.4 million), and the United States with 3,001 tons (valued at US\$2.2). Exports to the United States consisted of 1,407 tons of sardines, 1,250 tons of anchovies, and 12 tons of tuna. (Conservas de Peixe, November 1956.)

CANNED FISH PACK, JANUARY-SEPTEMBER 1956: The total pack of canned fish for January-September 1956 amounted to 32,164 tons as compared with 26,198 tons in a similar period of 1955. Canned sardines in oil (13,748 tons) accounted for 43 percent of the January-September 1956 total canned fish pack, but in the same period in 1955 they accounted for 70 percent (18,214 tons). The pack of sardinelike fish in oil for the first nine months in 1956 of 10,495 tons is much higher than the 2,672 tons packed during the same period in 1955.

Product	Net Weight	Canners' Value
	Metric Tons	US\$
In Olive Oil:		1,000
Sardines	13,748	8,267
Sardinelike fish	10,495	5,353
Tuna	1,514	1,184
Other species (incl. shellfish)	555	374
In Brine:		
Sardinelike fish	4,414	1,116
Other species	1,438	262
Total	32,164	16,556
NOTE: VALUES CONVERTED TO US\$ EQUIVALENT: 28.75 ESCUDOS EQUAL US\$1.		

The Portuguese pack of canned sardines in oil during the month of September 1956 (6,710 tons) was almost double the 3,511 tons packed during the previous month and higher by 1,913 tons than the 4,797 tons packed in September 1955. The pack of all canned fish in September 1956 amounted to 11,823 tons, the January 1957 Conservas de Peixe reports.

Prices to the canners for canned sardines in oil during January-September 1956 were higher by about 14 percent as compared with the similar period in 1955.

* * * * *

FISHERIES TRENDS, AUGUST-SEPTEMBER 1956: Sardine Fishing: The Portuguese sardine catch during September 1956 increased to 19,883 metric tons (ex-vessel value US\$1,761,078), or 8,472 tons above the catch of 11,411 tons for the previous month. The September sardine catch was good and exceeded that for September 1955 by 3,907 tons. By the end of September the sardine fishery was beginning to improve as compared with the first eight months during which catches were well below the first eight months of 1955.

Sardines purchased by the packing centers during August amounted to 5,167 tons (value US\$667,000), and 11,004 tons (value US\$1,283,000) in September. During August 1955 the canners purchased 8,356 tons (valued at US\$1,102,000), and 8,889 tons (valued at US\$1,015,000) in September. The balance of the sardine catch in both months entered the fresh fish market.

The principal port of landing for sardines in August and September was Matosinhos with between 51-54 percent of the catch, followed by Setubel and Lisbon.

Other Fishing: The August 1956 landings of fish other than sardines totaled 11,790 metric tons (valued at US\$1,221,627 ex-vessel) and consisted of 2,003 tons of tuna, 5,578 tons of mackerel, 4,140 tons of chinchard, 15 tons of bonito, and 54 tons of anchovy.

In September 1956, landings of fish other than sardines totaled 2,314 metric tons (valued at US\$127,097 ex-vessel) and consisted of 2,254 tons of chinchard, and 60 tons of anchovy (Conservas de Peixe, October and November 1956).



Spain

VIGO FISHERIES TRENDS, NOVEMBER 1956: Fishing: Landings at Vigo during November 1956 totaled 10.9 million pounds valued at about US\$963,970 ex-vessel. The November catches were about 29 percent lower than those of the previous month and about 12 percent below the November 1955 catches. However, November 1956 was considered a fair month by the fishing industry, states a December 6 dispatch from the United States Consul in Vigo.

An increase in average prices for fresh fish is one more indication of the higher cost of living. Operating expenses of the fishing fleets and distributors went up as the result of the new official wage rates. It is said that the new wage scales represent an increase of about 30 percent for the fishing industry.

Small and some medium-size sardines were the principal catches during November a total of 3.4 million pounds, followed by horse mackerel (*Trachurus trachurus*) with 1.9 million pounds. Albacore tuna catches were insignificant during November--as the season was over. One other species of commercial importance in November was the "castaneta" or dollarfish.

A number of fishing vessels operate out of small ports in the Province of Lugo, but part of the catches are landed at ports in Asturias, especially their albacore catches which amounted to 2.9 million pounds during the June to November season.

Fish Canning: The fish canneries in the Vigo area purchased 2.2 million pounds of fresh fish during the month as compared with 4.9 million pounds for the previous month and 3.7 million pounds in November 1955. Most canneries were operating during November 1956, but on a reduced scale as compared with the previous month.

Sardines and clams were the principal species available for packing. However, during the latter part of November, the canneries commenced to purchase a portion of the heavy catches of horse mackerel. Fishing interests feel certain that the sardine is returning to Spanish coastal waters due to the presence of small fish in the catches. The present sardine catches range from 14-18 fish to a pound as compared with 11-13 a pound for the large sardine taken in past years.

The fish canneries continue to be deeply concerned over the tinplate situation. Some of the leading canneries (about 14 in the Vigo area) make their own cans but have lithographing done outside. It is reported that the imports of tinplate amounted to 8,000 cases weighing approximately 1.7 million pounds during November. However, a portion of this quantity reached other parts of Spain, but a fair share was made available to the canneries in the Vigo area. The supply of tinplate is considered inadequate by the canneries.

Olive oil for fish packing is usually scarce and often difficult to obtain. Although the official price is 18.6 U. S. cents a pound, there is an open market and the canneries usually find it necessary to pay higher prices. It is the general opinion, however, that there will be no serious shortage of olive oil and the prospects are good for an adequate supply during 1957.

For some cannery workers, there is an increase of 100 percent in wages. Women packers formerly earning around US\$0.51 a day are now being paid approximately US\$1.03 a day. It is believed that the price of canned fish will be increased about 20 percent in some manner as the result of the new wage scales. Domestic sales have been fair but slowed up slightly around the end of November.

Exports of canned fish also slowed up, due to the price situation. The canneries now feel that the Spanish Government should allow a higher rate of exchange (presently 33,385 pesetas to the U. S. dollar) on exports or increase their percentage of foreign exchange (presently 20 percent) which is allowed for the payment of approved imports.

NOTE: VALUES CONVERTED TO US\$ EQUIVALENT AT RATE OF 1 PESETA EQUALS US\$0.0257.



Sweden

NEW REGULATIONS FOR BALTIC FISHING: Swedish government regulations (effective February 1, 1957) for the protection of certain species of fish in the Baltic have removed the prohibition concerning plaice fishing during February and March, states a January 29 dispatch from the United States Consul at Göteborg.

Under the new regulations the minimum sizes for plaice have been changed from 18-24 centimeters (7.1-9.4 inches) to 26 centimeters (10.2 inches) and for founders from 18-22 centimeters (7.1-8.7 inches) to 20 centimeters (7.9 inches). For cod there is a minimum size of 30 centimeters (11.8 inches) which is the same as is permitted in the North Sea and the Oresund.

The minimum size in the meshes of trawls, seines, and similar fishing equipment has been increased from 6.5 to 7.0 centimeters (from 2.6 to 2.8 inches) for the catching of mackerel, herring, eel, shrimp, and a few other types of fish, in the Baltic, the Oresund, and the Belts. The regulation on mesh size become effective

May 1, 1957. However, fishing gear now permitted may be used until January 1, 1958, provided the cod ends conform to the new regulations as to the mesh size.



Thailand

JOINT THAILAND-JAPANESE FISHING BASE PROPOSED: According to press reports from Thailand, a new fishing base will be constructed on Terutea Island, off the western coast of South Thailand, with the help of the Japanese Overseas Fishery Cooperative Association. A group of Japanese headed by the Chairman of the Cooperative Association were expected to meet with Thai Government officials in Bangkok on February 12. The group was to survey the possibilities of developing new fishery resources, construction of a fishing base to accommodate 100 fishing vessels, and facilities for cold storage, processing, and canning.



Turkey

CANNED MACKEREL MARKET: The pack of canned mackerel in Turkey is carried on in privately-owned factories located in Istanbul, Gelibolu, Ergli, Izmir, and Canakkale.

Consumption of both fresh and canned mackerel has been increasing steadily over the past ten years. Most of the pack is natural, but some also contains olive oil. Practically all of the cans used are oval. The retail price varies considerably depending upon the supplier. Based on a recent price survey, the price in Ankara varied from TL1.60 to TL2.50 (57-88 U. S. cents) for cans varying from 95-150 grams (3.4-5.3 ounces) net. The retail price of fresh mackerel varies with the season. Prices this winter in Istanbul varied from TL10.50 to TL16.50 per kilo (US\$1.69-2.65 a pound).

There have been no imports of canned mackerel into Turkey.

Turkey exports fresh and salted mackerel to Greece, Italy, Bulgaria, the United States, and Yugoslavia. In 1954, the last year for which data are available, Turkey exported a total of 9,471,902 pounds of fresh and 4,149,552 pounds of salted mackerel.

Because of the shortage of foreign exchange, all imports into Turkey are under license. Only those commodities that are absolutely essential to the economy of the country are granted licenses. Because of the size of the domestic fishing industry and the low priority placed upon food items, there appears to be no potential market for canned mackerel in Turkey in the near future, states a January 16, 1957, dispatch from the United States Embassy in Ankara.

NOTE: VALUES CONVERTED AT THE RATE OF US\$1 EQUALS 2.80 LIRAS.



U. S. S. R.

A MECHANICAL METHOD OF DRESSING COD ABOARD FISHING VESSELS: The cutting of cod by hand aboard fish vessels requires a great deal of room as well as labor and often consumes time that should be spent in fishing. Therefore, advantages of mechanization should be considered, points out an article in the November 1956 issue of the French periodical La Pêche Maritime La Pêche Fluviale, and La Pisciculture.

The method most commonly used at sea to dress fish for shipping as fresh or salted is shown in figure 1. The head is cut off with a special knife prior to gutting the

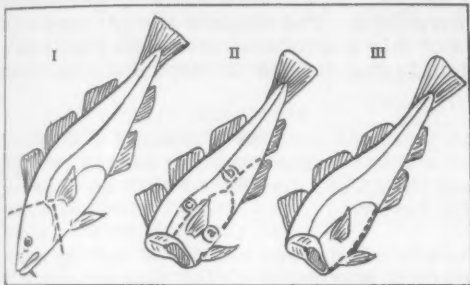


FIG. 1 - I, REMOVAL OF THE HEAD. II, CUTTING FOR SALTING: (A) THE STOMACH CUT EXTENDING TO THE ANAL ORIFICE; (B) THE MUSCLE CUT THE LENGTH OF THE FIRST ANAL FIN; (C) THE SWIM BLADDER CUT. III, CUTTING FOR DISTRIBUTION AS FRESH FISH.

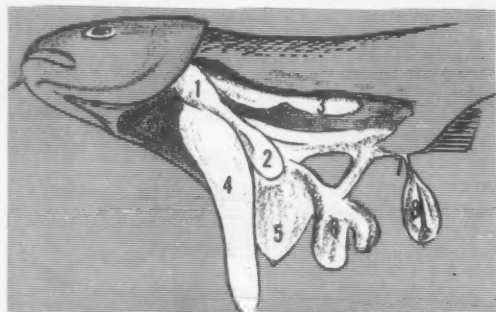


FIG. 2 - DISPOSITION OF THE INTERNAL ORGANS OF THE COD. 1, ESOPHAGUS, 2, STOMACH, 3, SWIM BLADDER, 4, LIVER, 5, PYLORUS, 6, INTESTINE, 7, ANAL ORIFICE, 8, ROE.

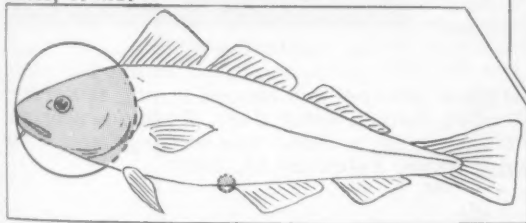


FIG. 3 - SCHEMATIC DIAGRAM SHOWING THE CUTTING OF COD BY THE NEW METHOD.

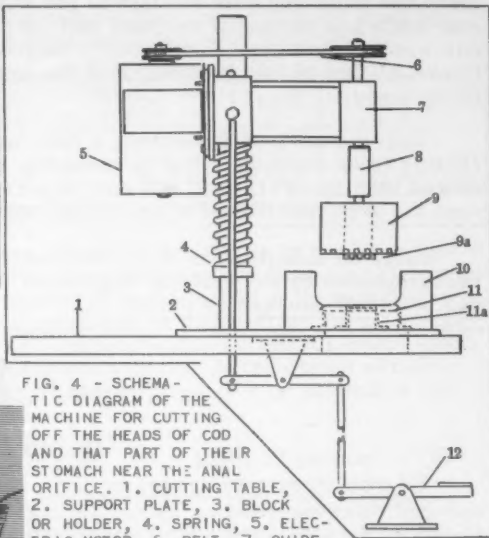


FIG. 4 - SCHEMATIC DIAGRAM OF THE MACHINE FOR CUTTING OFF THE HEADS OF COD AND THAT PART OF THEIR STOMACH NEAR THE ANAL ORIFICE. 1, CUTTING TABLE, 2, SUPPORT PLATE, 3, BLOCK OR HOLDER, 4, SPRING, 5, ELECTRIC MOTOR, 6, BELT, 7, GUIDE, 8, SHAFT, 9 & 9A, REMOVABLE CIRCULAR KNIVES FOR CUTTING THE HEAD OR STOMACH AROUND THE ANAL ORIFICE, 10, SUPPORT PLATE FOR FISH, 11 & 11A, FIXED KNIVES, 12, PEDAL.

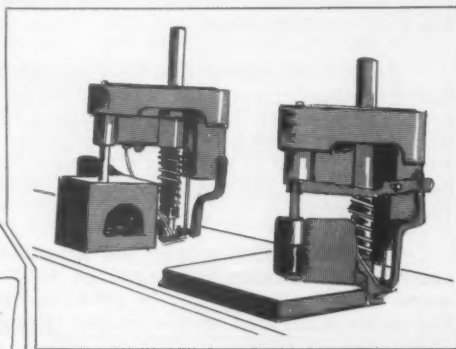


FIG. 5 - UNITS FOR CUTTING FISH: AT THE RIGHT THE MACHINE FOR CUTTING THE ANAL PORTION; AT THE LEFT, THE MACHINE FOR CUTTING THE HEAD.

fish In the second method, the muscles of the fish are cut parallel to the spinal column to the end of the first anal fin. Using this method, two-man teams can process 20 to 25 fish a minute. When the catch is heavy, the entire crew may be commandeered for this operation and thus slow up or stop the setting of the net.

A study of cod has shown that the viscera are attached at two points--near the head in the ventral cavity and near the anal orifice (figure 2). This anatomical knowledge has been utilized by the trawler Dniepr to improve the manual cutting of fish--the procedure developed was in fact the basis of the mechanical method.

The device used for cutting cod is analogous to a boring machine where the bit has been replaced by a circular knife. There are two units; the first has a small-diameter knife and cuts the fish at the anal orifice. The second has a large-diameter knife and chops off the head and its connections. The viscera are of course now easily taken out. A schematic diagram of this mechanical cutting is shown in figure 3. One of the advantages of the system is that it does not depend on the size of the cod

With the devices described, a four-man team can process a vessel's fish, including liver sorting. After processing, the cod are washed and placed in a refrigerated hold of +7° C. (45° F.) and 40 percent ice. They are placed back up to prevent the accumulation of water in the ventral cavity.

After an examination of the results, the aforementioned method of cutting was recommended by the Fishing Regulation Board of Murmansk. Fish thus processed can be either smoked or salted

NOTE: TRANSLATED FROM FRENCH BY ROBERT DUCKWORTH.



United Kingdom

SILVER COD AWARD MADE FOR 1956: The British Trawlers' Federation "Silver Cod" was awarded on March 19 to the Captain and crew of the Hull deep-water trawler Lancella. The award was first made in 1954 by the Trawler's Federation as a means of encouraging the Captains and crews to land more fish. The guest of honor at the dinner and presentation of the Silver Cod award was the Duke of Edinburgh.

To win the Silver Cod the Lancella landed 2,871 metric tons of fish made in 18 trips mostly to Bear Island Grounds, averaging 18 days per trip. The fish were sold ex-dock for close to 5d. (about 5.8 U.S. cents a pound). Second honors went to the Arctic Warrior with close to 2,832 tons.



SILVER COD TROPHY

The Silver Cod trophy has aroused great interest and caused strong competition among the Captains and crews of the British distant-water fleet. Previous winners were the Arctic Warrior in 1954, and the Kirkella in 1955. The winning Captain has his name inscribed on the trophy (Fishing News, February 15, 1957).

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, JULY 1956, P. 89.



Yugoslavia

CANNED MACKEREL AND PILCHARD MARKET: Landings of mackerel and pilchard in Yugoslavia totaled 8,802 metric tons during 1955, or about 65 percent of

Table 1 - Yugoslav's Landings and Pack of Mackerel and Pilchards, 1953-55

1955	1954	1953	1955	1954	1953
(Metric Tons)					
8,802	10,928	13,623	4,298	5,016	4,542

Yugoslav exports a major part of its production of mackerel and pilchards. The pack of canned mackerel and pilchard amounted to 4,298 tons in 1955 as compared with 5,016 tons in 1954. Yugo-

Exports of canned mackerel during 1955 totaled approximately 2,063 tons (excluding tuna) as compared with 918 tons in 1954 (table 2). Exports of canned pilchards showed a considerable decrease in 1955 with a total of 1,645 tons as compared with 2,623 tons in 1954.

Marketing prospects for United States canned mackerel in Yugoslavia are not promising, states a dispatch (January 11) from the United States Embassy in

Belgrade. Exports of canned fish are of considerable importance to the Yugoslav economy and exporters are doing their best to place more of the Yugoslav fish product on the world market. Furthermore, Yugoslavia is subject to a chronic dollar shortage and the majority of available dollar exchange is utilized for the purchase of machinery and other material essential to Yugoslav industry and for basic food-stuffs, such as wheat, which is the major commodity in the United States aid program to this country. There are no imports of canned mackerel or pilchards into Yugoslavia.

Table 2 - Yugoslav's Exports of Canned Mackerel and Pilchards, January-June 1956 and Years 1953-55				
Product	January-June 1956	1955	1954	1953
Mackerel ^{1/}.....	..... (Metric Tons).....			
Pilchards				
	347	2,427	1,080	605
	1,694	1,645	2,623	1,635
^{1/} Almost 15 percent of mackerel exports is actually canned tins.				

Table 3 - Retail Prices for Canned Mackerel and Pilchards in Yugoslavia

Size of Can	Price per Can	
	Dinars	U. S. Cents
3.5 ounces	80-130	13-21
7.0 ounces	180-220	28-35
8.8 ounces	250-280	40-44
17.6 ounces	420-500	66-79
2.2 pounds	800-900	\$1.27-1.52

About 50 percent of the consumers prefer the 3.5-ounce can, 15 percent the 7-ounce can, 15 percent the 8.8-ounce can, 8 percent the 17.6-ounce can, and 12 percent the 2.2-pound can. About 35 percent of the consumers prefer pilchards and mackerel packed with olive oil, 50 percent

with seed oil, 10 percent with tomato sauce, and 5 percent in brine.

NOTE: VALUES CONVERTED AT THE SETTLEMENT RATE OF 632 DINARS EQUAL US\$1.

FISH CONSUMPTION: Fresh and canned fish consumption in Yugoslavia varied from 7,817 metric tons in 1955, to 8,386 tons in 1954, and 6,454 tons in 1953. In 1955 about 1,769 tons of the consumption consisted of canned, dried, and smoked fish. The average annual per capita consumption of canned fish in Yugoslavia was about 330 grams (11.6 pounds) in 1954/55 and 300 grams (10.6 pounds in 1953/54.)





FEDERAL ACTIONS



Department of the Interior

U. S. FISH AND WILDLIFE SERVICE

ALASKA'S COMMERCIAL FISHING REGULATIONS FOR 1957

Changes in the Alaska commercial fishing regulations to be effective during the 1957 season were made public March 6 by Assistant Secretary of the Interior Ross L. Leffler. These regulations are in effect 30 days after publication in the Federal Register.

The area registration provisions, instituted in 1956, which prohibited movement of salmon fishing boats and nets from one area to another, proved effective and will be continued under the new regulations.

Highlights of the regulations as considered by areas shows that the fishing-gear timetable of control used in Bristol Bay in 1956 will be continued and expanded. One new feature in Bristol Bay is that the picking of salmon from gill nets is deemed to be a part of the fishing operation and must be performed by the fisherman to whom the gear is legally registered.

In the Alaska Peninsula area, gear-timetable control will be applied in the Bear River district. Only the fishing time to be allowed at the opening of the season will be affected. Weekly adjustments are not provided for. A relaxation in the northeastern district will permit purse seines to be used as far east as the entrance to Port Heiden, after July 10. The July 10 date has been specified to insure that Bristol Bay red salmon runs will have passed that area before the season opens. On the south side of the Alaska Peninsula the pink salmon season will close August 2 because of anticipated smaller runs of pink salmon.

In the Chignik area the closed waters at the inner end of the lagoon have been increased to prevent overfishing there at low tide. To reduce the fishing effort further, all traps in the area have been closed for 1957, and the weekly closed period has been split so as to provide more even escapement of salmon to the spawning grounds.

The main change in the Kodiak area is the elimination of the midseason closure during the pink salmon season. This relaxation will be offset by an increase in the weekly closed periods, designed to provide more even distribution of escapements. Minor changes include the creation of the Olga-Moser Bay section of the Alitak district so that protection to the red runs there can be applied without affecting the pink salmon runs in Alitak Bay, and the creation of the Sturgeon River district to permit harvesting chum runs to the Sturgeon River without affecting the runs of red salmon to Red River.

In Cook Inlet, gear-timetable control during the red salmon season from July 1 to July 27 will be applied. It will be of the type designed for the Bear River district in the Alaska Peninsula. As in Bristol Bay, during the July 1-July 27 season gill nets will be required to be picked by the crews to whom registered. In addition, the regulations have been rewritten to close areas where set nets are now used in order to prevent any expansion in the use of that type of gear.

In Prince William Sound the season will not close until August 10. However, in order to limit the fishery, in view of the mediocre runs expected, fishing will be controlled by reductions in gear. Essentially, gear reduction in 1957 is to be accomplished by voluntary closure of all but 11 of the 42 traps; increases in closed

areas in a number of bays; and gear-timetable control of purse seines based on 135 seines. The closing date of the seasons will be advanced according to the timetable if there is any increase in seines above that number.

The only significant change for the Yakutat area is an increase in the weekly closed periods prior to August 11 to afford greater protection to the red salmon runs because of a continuing increase in the amount of gear in that area.

Southeastern Alaska will have essentially the same pink salmon conservation program which has been in effect since 1954 and has shown promising results.

Two major changes were made in the gill-net fisheries. The first is to provide for limited use of gill nets at Lake, Salmon, and Red Bays to harvest the red salmon runs which have not been tapped in recent years.

Burroughs Bay will be closed to fishing this year. This fishery has been criticized because king salmon taken there are consistently of poor quality and it is felt that these mature fish should be protected for escapement purposes. The waters of Portland Canal have been opened to the use of gill nets. The International Boundary between Alaska and Canada runs down the middle of Portland Canal and on the Canadian side of the line the use of gill nets is permitted. The regulations, as written, will now provide identical seasons on both sides.

NOTES ALSO SEE COMMERCIAL FISHERIES REVIEW, MAY 1956, P. 65.



Department of Health, Education, and Welfare

FOOD AND DRUG ADMINISTRATION

ORDER ON CANNED TUNA IDENTITY AND FILL-OF-CONTAINER STANDARD ISSUED:

An order acting on the proposal to adopt definition and standards of fill of container for canned tuna was published

in the Federal Register of February 13, 1957, by the Food and Drug Administration of the U. S. Department of Health, Education, and Welfare.

The standard designates the various species of fish which may be called tuna; defines the styles of pack and requires uniform names for these, namely, "solid" or "solid pack," "chunks" or "chunk style," "flake" or "flakes," and "grated," and requires an accurate labeling statement as to the color of the tuna, and provides for differentiating between the shades of color by use of a special optical instrument so that there need be no reliance on opinion as to the color. Under the standard, tuna is to be labeled as "white," "light," "dark," and "blended."

The name of the packing medium is required to be shown on the label. The permitted liquids are vegetable oils, olive oil, and water. Optional use of seasoning ingredients with appropriate label declaration is permitted.

The standards spell out the fill of container for each size and for each type of canned tuna. Compliance with the requirements for fill of container are determined by removing the contents of a can, pressing out the oil and watery juices, and weighing the press cake consisting of cooked fish or relatively uniform composition.

The definition and standard of identity promulgated by this order shall become effective on February 13, 1958, and the standard of fill of container shall become effective 90 days after February 13, 1957, except in each case any provisions that may be stayed by the filing of exceptions thereto. Notice of the filing of objections, or lack thereof, will be announced by publication in the Federal Register.

In the meantime the Food and Drug Administration has received a request for a 60-day extension of time in which to file objections to the order promulgating a definition and standard of identity and standards of fill of container for canned tuna. The extension was granted by the Administration, and the March 7 Federal Register states that the time for filing objections is extended until May 13, 1957.

TITLE 21—FOOD AND DRUGS

Chapter 1—Food and Drug Administration, Department of Health, Education, and Welfare

PART 37—FISH; DEFINITIONS AND STANDARDS OF IDENTITY; STANDARDS OF FILL OF CONTAINER

ORDER ACTING ON PROPOSAL TO ADOPT DEFINITION AND STANDARD OF IDENTITY AND STANDARDS OF FILL OF CONTAINER FOR CANNED TUNA FISH

In the matter of adopting a definition, and standard of identity and standards of fill of container for canned tuna fish:

A notice of proposed rule making was published in the FEDERAL REGISTER of August 28, 1956 (21 F. R. 6492), setting forth a proposal to adopt a definition and standard of identity and standards of fill of container for canned tuna fish. Comments and suggestions were received from a number of interested persons. After due consideration of the comments and suggestions received, the information furnished by the petitioner, and other relevant and reliable information, it is concluded that it will promote honesty and fair dealing in the interest of consumers to adopt, with minor modifications, the proposed definitions and standards of identity and fill of container for canned tuna fish published in the FEDERAL REGISTER of August 28, 1956 (*supra*).

Therefore, pursuant to the authority vested in the Secretary of Health, Education, and Welfare by the Federal Food, Drug, and Cosmetic Act (secs. 401, 701, 52 Stat. 1046, 1055 as amended 70 Stat. 919; 21 U. S. C. 341, 371) and delegated to the Commissioner of Food and Drugs by the Secretary (20 F. R. 1996; 21 F. R. 6581): It is ordered, That the following new part be added to Chapter I.

Sec.

- 37.1 Canned tuna; definition and standard of identity; label statement of optional ingredients.
- 37.3 Canned tuna; fill of container; label statement of substandard fill.

AUTHORITY: §§ 37.1 and 37.3 issued under sec. 701, 52 Stat. 1055 as amended; 21 U. S. C. 371. Interpret or apply sec. 401, 52 Stat. 1046; 21 U. S. C. 341.

§ 37.1 Canned tuna; definition and standard of identity; label statement of optional ingredients. (a) Canned tuna is the food consisting of processed flesh of fish of the species enumerated in paragraph (b) of this section, prepared in one of the optional forms of pack specified in paragraph (c) of this section, conforming to one of the color designations specified in paragraph (d) of this section, in one of the optional packing media specified in paragraph (e) of this section, and may contain one or more of the seasonings and flavorings specified in paragraph (f) of this section. It is packed in hermetically sealed containers and so processed by heat as to prevent spoilage. It is labeled in accordance with the provisions of paragraph (h) of this section.

(b) The fish included in the class known as tuna fish are:

Thunnus thynnus.....	Bluefin tuna. ¹
Thunnus maccoyii.....	Southern bluefin tuna. ¹
Thunnus orientalis.....	Oriental tuna. ²
Thunnus germon.....	Albacore. ³

Parathunnus mebachi.....	Big-eyed tuna. ²
Neothunnus macropterus.....	Yellowfin tuna. ²
Neothunnus rarus.....	Northern bluefin tuna. ²
Katsuwonus pelamis.....	Skipjack. ³
Euthynnus alletteratus.....	Little tunny. ²
Euthynnus lineatus.....	Little tunny. ²
Euthynnus yaito.....	Kawakawa. ⁴

¹ "A Comparison of the Bluefin Tunas, Genus Thunnus, from New England, Australia, and California," by H. C. Godall and Edwin K. Holmberg, State of California, Department of Natural Resources, Division of Fish and Game, Bureau of Marine Fisheries, Fish Bulletin No. 77 (1950).

² "Contributions to the Comparative Study of the So-called Scombroid Fishes," by Kamakichi Kishinouye, Journal of the College of Agriculture, Imperial University of Tokyo, Vol. VIII, No. 3 (1923).

³ "A Systematic Study of the Pacific Tunas," by H. C. Godall and Robert D. Byers, State of California, Department of Natural Resources, Division of Fish and Game, Bureau of Marine Fisheries, Fish Bulletin No. 60 (1944).

⁴ "A Descriptive Study of Certain Tuna-Like Fishes," by H. C. Godall, State of California, Department of Fish and Game, Fish Bulletin No. 97.

The description of each species will be found in the text to which reference is made.

(c) The optional forms of processed tuna consist of loins and other striated muscular tissue of the fish. The loin is the longitudinal quarter of the great lateral muscle freed from skin, scales, visible blood clots, bones, gills, viscera, and from the nonstriated part of such muscle, which part (known anatomically as the median superficial muscle), is highly vascular in structure, dark in color because of retained blood, and granular in form. Canned tuna is prepared in one of the following forms of pack, the identity of which is determined in accordance with the methods prescribed in § 37.3 (b).

(1) Solid or solid pack consists of loins freed from any surface tissue discolored by diffused hemolyzed blood, cut in transverse segments to which no free fragments are added. In containers of 1 pound or less of net contents, such segments are cut in lengths suitable for packing in one layer. In containers of more than 1 pound net contents, such segments may be cut in lengths suitable for packing in one or more layers of equal thickness. Segments are placed in the can with the planes of their transverse cut ends parallel to the ends of the can. A piece of a segment may be added if necessary to fill a container. The proportion of free flakes broken from loins in the canning operation shall not exceed 18 percent.

(2) Chunk, chunks, chunk style consists of a mixture of pieces of tuna in which the original muscle structure is retained. The pieces may vary in size, but not less than 50 percent of the weight of the pressed contents of a container is retained on a ½-inch-mesh screen.

(3) Flake or flakes consist of a mixture of pieces of tuna in which more than 50 percent of the weight of the pressed contents of the container will pass through a ½-inch-mesh screen, but in which the muscular structure of the flesh is retained.

(4) Grated consists of a mixture of particles of tuna that have been reduced to uniform size, that will pass through a ½-inch-mesh screen, and in which the

particles are discrete and do not comprise a paste.

(5) Any of the specified forms of pack of canned tuna may be smoked. Canned smoked tuna shall be labeled in accordance with the provisions of paragraph (h) (5) of this section.

(d) Canned tuna, in any of the forms of pack specified in paragraph (c) of this section, falls within one of the following color designations, measured by visual comparison with matte surface neutral reflectance standards corresponding to the specified Munsell units of value, determined in accordance with paragraph (g) of this section.

(1) *White*. This color designation is limited to the species Thunnus germon (albacore), and is not darker than Munsell value 6.3.

(2) *Light*. This color designation includes any tuna not darker than Munsell value 5.3.

(3) *Dark*. This color designation includes all tuna darker than Munsell value 5.3.

(4) *Blended*. This color designation may be applied only to tuna flakes specified in paragraph (c) (3) of this section, consisting of a mixture of tuna flakes of which not less than 20 percent by weight meet the color standard for either white tuna or light tuna, and the remainder of which fall within the color standard for dark tuna. The color designation for blended tuna is determined in accordance with paragraph (g) of this section.

(e) Canned tuna 's packed in one of the following optional packing media:

(1) Any edible vegetable oil other than olive oil, or any mixture of such oils not containing olive oil.

(2) Olive oil.

(3) Water.

(f) Canned tuna may be seasoned or flavored with one or more of the following:

(1) Salt.

(2) Purified monosodium glutamate.

(3) Hydrolyzed protein.

(4) Hydrolyzed protein with reduced monosodium glutamate content.

(5) Spices or spice oils or spice extracts.

(6) Vegetable broth in an amount not in excess of 5 percent of the volume capacity of the container, such broth to consist of a minimum of 0.5 percent by weight of vegetable extractives and to be prepared from two or more of the following vegetables: Beans, cabbage, carrots, celery, garlic, onions, parsley, peas, potatoes, green bell peppers, bell peppers, spinach, and tomatoes.

(7) Garlic.

(g) For determination of the color designations specified in paragraph (d) of this section, the following method shall be used: Recombine the separations of pressed cake resulting from the method prescribed in § 37.3 (b). Pass the combined portions through a sieve fitted with woven-wire cloth of the specifications which complies with the specifications for such wire cloth set forth in "Standard Specifications for Sieves," published March 1, 1940, in L. C. 584 of the U. S. Department of Commerce, National Bureau of Standards. Mix the sieved material and place a sufficient quantity into a 307 x 113 size container (bearing a top seam and having a false bottom approximately ½-inch deep and painted flat black inside and outside)

so that after tamping and smoothing the surface of the sample the material will be $\frac{1}{8}$ -inch to $\frac{1}{4}$ -inch below the top of the container. Within 10 minutes after sieving through the $\frac{1}{4}$ -inch mesh woven-wire cloth, determine the Munsell value of sample surface.

(1) Determine the Munsell value of the sample surface so prepared. The following method may be used, employing an optical comparator, consisting of a lens and prism system which brings two beams of light, reflected from equal areas of sample surface and standard surface, respectively, together, within an eyepiece, so as to show an equally divided optical field. The scanned areas of sample and standard surface are not smaller than 2 square inches. Light reaching the eye is rendered sufficiently diffuse, by design of eyepiece and comparator, so that detail of the sample surface will remain undefined, to a degree such as to avoid visual confusion in observation of a match of over-all intensity of reflected light. The eyepiece contains a color filter centering at a wavelength between 550 m μ and 560 m μ . The filter does not pass appreciable visible radiation of wavelengths below 540 m μ or above 570 m μ . The passed wavelength band is of a monochromaticity sufficient to cause a sample and a neutral standard of equal reflectance to appear of the same hue. The comparator is rigidly mounted on a vertical stand attached to a base in which arrangement is provided for securely and accurately positioning two cans of size 307 x 113 in the two fields of view. Mounted on the base are two shaded lamps, which direct the center of their beams of light at about a 45° angle to the plane of the sample and standard surfaces. The lamps are so positioned that light from one bears mainly upon the sample surface and light from the other mainly on the standard surface, and are so placed in relation to sample and standard that no shadows, as from the can rims, appear in the fields of view. The lamps are strong enough to furnish adequate and convenient illumination through eyepiece and filter. Means is provided to alter the light intensity of one lamp in relation to the other, as may conveniently be achieved by using a 100-watt tungsten filament bulb in one lamp and using, in the other, a similar 150-watt bulb connected with the power source through a suitable rheostat. The stand is equipped with nonglossy black curtains on the side of the observer, to exclude variation in extraneous light reflected from the person of the observer.

(2) To adjust the comparator, place a pair of matte surface standards of Munsell value 5.3, mounted as described in subparagraph (4) of this paragraph, in position in the comparator base, and adjust the intensity of the variable lamp until the two halves of the optical field, viewed through the eyepiece, are of equal brightness. Then remove one of the standards and replace it with the prepared sample. Without altering any other adjustment, observe through the eyepiece whether the sample appears lighter or darker than the standard. In case of examination of albacore designated "white," conduct the procedure using standards of Munsell value 6.3.

(3) The standards with which comparisons are made are essentially neutral matte-finish standards, equivalent in luminous reflectance of light of 555 m μ wavelength to 33.7 percent of the luminous reflectance of magnesium oxide (for Munsell value 6.3) and 22.6 percent of the luminous reflectance of magnesium oxide (for Munsell value 5.3), as given by the relationship between Munsell value and luminous reflectance derived by a subcommittee of the Optical Society of America and published in the "Journal of the Optical Society of America," Volume 33, page 406 (1943).

(4) These standards shall be cut in circles $3\frac{3}{4}$ inches in diameter and shall be mounted in 307 x 113 size containers, bearing a top seam and painted flat black inside and outside, so that the surfaces of the standards are $\frac{3}{16}$ inch below the top of the containers in which they are mounted.

(5) In the case of blended tuna, the foregoing method shall be varied by first separating the tuna flakes of the two different colors before passing them through the $\frac{1}{4}$ -inch mesh sieve, then proceeding with each portion separately for the determination of its color value, employing, if necessary, a sample container with false bottom greater than $\frac{1}{2}$ inch deep.

(h) (1) The specified names of the canned tuna for which definitions and standards of identity are prescribed by this section, except where water is the packing medium or where the tuna is smoked, are formed by combining the designation of form of pack with the color designation of the tuna; for example, "Solid pack white tuna," "Grated dark tuna," etc. In the case of blended tuna, there shall be used both applicable color designations of the blended flakes, in precedence determined in accordance with the predominating portion found in the container; for example, "Blended white and dark tuna flakes," "Blended dark and light tuna flakes."

(2) The specified name of canned tuna when water is used as the packing medium is formed as described in subparagraph (1) of this paragraph, followed by the words "in water"; for example, "Grated light tuna in water."

(3) When the packing medium is vegetable oil or olive oil, the label shall bear the name of the optional packing medium used, as specified in paragraph (e) of this section, preceded by the word "in" or the words "packed in." In case of the optional ingredient specified in paragraph (e) (1) of this section, the name or names of the oil used may be stated, or the general term "vegetable oil" may be used.

(4) In case solid pack tuna is packed in olive oil, the designation "Tonno" may also appear.

(5) In case any of the specified forms of canned tuna are smoked, the word "smoked" shall appear as a part of the name on the label; for example, "Smoked light tuna flakes."

(6) Where the canned tuna contains one or more of the ingredients listed in paragraph (f) of this section, the label shall bear the statement "Seasoned with _____" the blank being filled in with the name or names of the ingredient or ingredients used, except that if the ingredient designated in paragraph

(f) (6) of this section is used the blank shall be filled with the term "vegetable broth"; and if the ingredient designated in paragraph (f) (5) of this section is used alone, the label may alternatively bear either the statement "spiced" or the statement "with added spice"; and if salt is the only seasoning ingredient used the label may alternatively bear any of the statements "salted," "with added salt," "salt added."

(7) Wherever the name of the food appears on the label so conspicuously as to be easily seen under customary conditions of purchase, the names of the optional ingredients used as specified by subparagraphs (3) and (6) of this paragraph shall immediately and conspicuously precede or follow such name without intervening written, printed, or graphic matter, except that the common name of the species of tuna fish used may so intervene, but the species name "albacore" may be employed only for canned tuna of that species which meets the color designation "white," as prescribed by paragraph (d) (1) of this section.

§ 37.3 Canned tuna; fill of container; label statement of substandard fill. (a)

The standard of fill of container for canned tuna is a fill such that the average weight of the pressed cake from 24 cans, as determined by the method prescribed by paragraph (b) of this section, is not less than the minimum value specified for the corresponding can size and form of tuna ingredient in the following table:

I. Can size and form of tuna ingredient		II. Minimum value for weights of pressed cake (average of 24 cans)
		Ounces
211 x 109:		
Solid	.....	2.25
Chunks	.....	1.98
Flakes	.....	1.98
Grated	.....	2.00
307 x 113:		
Solid	.....	4.47
Chunks	.....	3.92
Flakes	.....	3.92
Grated	.....	3.96
401 x 206:		
Solid	.....	8.76
Chunks	.....	7.68
Flakes	.....	7.68
Grated	.....	7.76
603 x 408:		
Solid	.....	43.2
Chunks	.....	37.9
Flakes	.....	37.9
Grated	.....	38.3

If the can size in question is not listed, calculate the value for column II as follows: From the list select as the comparable can size that one having nearest the water capacity of the can size in question, multiply the value listed in column II for the same form of tuna ingredient by the water capacity of the can size in question and divide by the water capacity of the comparable can size. Water capacities are determined by the general method provided in § 10.2 (a) of this chapter. For the purposes of this section, cans of dimensions 211 x 109 shall be deemed to have a water capacity at 68° F. of 3.55 avoirdupois ounces of water; cans of dimensions 307 x 113, a water capacity of 7.05 avoirdupois ounces of water; cans of dimensions 401 x 206, a water capacity of 13.80 avoirdupois ounces of water; and cans of dimensions 603 x 408, a water capacity of 68.15 avoirdupois ounces of water.

(b) The methods referred to in paragraph (a) of this section for determining the weight of the pressed cake and referred to in § 37.1 (c) (1) for determining the percent of free flakes and the percent of pieces that pass through a ½-inch-mesh sieve are as follows:

(1) Have each of the 24 cans and contents at a temperature of 75° F. within ±5° F. Test each can in turn as follows:

(2) Cut out the top of the can (code end), using a can opener that does not remove nor distort the double seam.

(3) With the cut top held on the can contents, invert the can, and drain the free liquid by gentle finger pressure on the cut lid so that most of the free liquid drains from the can.

(4) With the cut lid still in place, cut out the bottom of the can with the can opener, then turn the can upright and remove the cut can top (code end). Scrape off any adhering tuna particles into the tuna mass in the can.

(5) Place the proper size of press cylinder as provided in paragraph (c) (1) of this section in a horizontal position on a table; then, using the cut bottom of the can as a pusher, gently force the can contents from the can into the cylinder so that the flat side of the can contents lies in contact with the bottom of the cylinder. Remove the bottom of the can that was used as the pusher and scrape any adhering particles from the can body and bottom of the can, and put them in the cylinder.

(6) Place the cylinder plunger on top of the can contents in the cylinder. Remove the eyebolt and put the cylinder and plunger in position on the press (paragraph (c) (3) of this section).

(7) Begin the operation of the press, and as soon as liquid is observed coming from the cylinder start timing the operation. Apply pressure to the plunger slowly and at a uniform rate, so that a full minute is used to reach a pressure of 384 pounds per square inch of plunger face in contact with the can contents. Hold this pressure for 1 additional minute and then release the pressure and disengage the plunger from the press shaft. Tip the press cylinder so that any free liquid is drained out.

(8) Remove press cylinder with plunger from the press, insert eyebolt in plunger and withdraw it from the cylinder. Loosen the pressed cake from the cylinder with a thin blade and remove the entire pressed cake as gently as possible, to keep the mass in a single cake during this operation. Place the pressed cake and any pieces that adhered to the plunger and cylinder in a tared receiving pan and determine the weight of the pressed material.

(9) For cans larger than 401 x 206, cut out the top of the can and drain off free liquid from the can contents as in operations described in subparagraphs (2) and (3) of this paragraph. Determine the gross weight of the can and remaining contents. Using a tared core cutter as provided for in paragraph (c) (2) of this section, cut vertically a core of the drained material in the can. Determine the weight of the core. With a thin spatula transfer the core to the pressing cylinder for 401 x 206 cans. Determine the weight of the pressed cake as

in the operations described in subparagraphs (5) through (8) of this paragraph. Remove the remaining drained contents of the can, reserving the contents for the determination of free flakes (subparagraph (11) of this paragraph), weigh the empty can, and calculate the weight of the total drained material. Calculate the weight of pressed cake on the entire can basis by multiplying the weight of the pressed cake of the core by the ratio of the weight of the drained contents of the can to the weight of the core before pressing.

(10) Repeat the determination of weight of pressed cake on the remainder of the 24 cans and determine the average weight of pressed cake for the purpose of paragraph (a) of this section.

(11) Determination of free flakes: If the optional form of tuna ingredient is solid pack, determine the percent of free flakes. Any flakes resulting from the operations described in this subparagraph or in other parts of this paragraph are to be weighed as free flakes. Only fragments that were broken in the canning procedure are considered to be free flakes. If the can is of such size that its entire drained contents were pressed as described in subparagraphs (1) to (8), inclusive, of this paragraph, examine the pressed cake carefully for free flakes. Using a spatula, scrape free flakes gently from the outside of the cake. Weigh the aggregate free flakes that were broken from the loin segments in the canning procedure and calculate their percentage of the total weight of pressed cake. If the can is of such size that a core was cut for pressing as described in subparagraph (9) of this paragraph, make the examination for free flakes on a weighed portion of the drained material remaining after the core was removed. The weight of the portion examined should approximately equal the weight of the core before pressing. Calculate the weight of the free flakes that were broken from the loins in the canning procedure as a percentage of the weight of the portion examined.

(12) Determination of particle size: If the optional form of tuna ingredient is chunks, flakes, or grated, the press-cake resulting from the operations described in subparagraphs (1) to (9), inclusive, of this paragraph is gently separated by hand, care being taken to avoid breaking the pieces. The separated pieces are evenly distributed over the top sieve of the screen separation equipment described in paragraph (c) (4) of this section. Beginning with the top sieve, lift and drop each sieve by its open edge three times. Each time, the open edge of the sieve is lifted the full distance permitted by the device. Combine and weigh the material remaining on the three top sieves (1½-inch, 1-inch, ½-inch screens), and determine the combined percentage retention by weight in relation to the total weight of the pressed cake.

(c) (1) The press cylinder and plunger referred to in paragraph (b) of this section are made of stainless steel. The press cylinders are made with a lip to facilitate drainage of the liquid. Plungers have a threaded center hole, about half as deep as the thickness of the plunger, for receiving a ringbolt to

assist in removing the plunger from the press cylinder. Dimensions for press cylinders and plungers are as follows:

For can size 211 x 109

Press cylinder:
Inside depth, approximately 3¼ inches.
Inside diameter, 2.593 inches.
Wall thickness, approximately ½ inch.
Plunger:
Thickness, approximately 1 inch.
Diameter, 2.568 inches.

For can size 307 x 113

Press cylinder:
Inside depth, approximately 4 inches.
Inside diameter, 3.344 inches.
Wall thickness, approximately ¾ inch.
Plunger:
Thickness, approximately 1¼ inches.
Diameter, 3.319 inches.

For can size 401 x 206

Press cylinder:
Inside depth, approximately 4¼ inches.
Inside diameter, 3.969 inches.
Wall thickness, approximately ¾ inch.
Plunger:
Thickness, approximately 1¼ inches.
Diameter, 3.944 inches.

For can sizes where the diameter is greater than 401, the core cutter described in subparagraph (2) of this paragraph shall be used and the resulting core pressed in the press cylinder for can size 401 x 206. For can sizes differing from those specified in this subparagraph, special press cylinders and plungers may be used. Special press cylinders have inside diameters ½-inch less than the outside diameters, at the double seam, for the can sizes for which the cylinders are used; plunger diameters are 0.025-inch less than the inside diameters of the press cylinders.

(2) The core cutter referred to in paragraphs (b) (9) and (11) and subparagraph (1) of this paragraph is made from a previously sealed 300 x 407 can. The cover, including the top seam, is cut out. The edge is smoothed and sharpened. A small hole to permit passage of air is made in the bottom.

(3) The hydraulic press referred to in paragraph (b) (6) to (10), inclusive, of this section is made by so mounting a hydraulic jack in a strong frame that it will press horizontally against the center of the plunger in the press cylinder used. The frame is so braced that it does not change shape when pressure is applied. The gauge on the hydraulic jack is so calibrated that it will indicate, for the plunger being used, when the plunger is pressing against the contents of the press cylinder with a pressure of 384 pounds per square inch of plunger face.

(4) The sieving device referred to in paragraph (b) (12) of this section consists of three sieves, each approximately 1 foot square, loosely mounted, one above the other, in a metal frame. The mesh in the top sieve complies with the specifications for 1½-inch woven-wire cloth as set forth in "Standard Specifications for Sieves," as published March 1, 1940, in L. C. 584 of the U. S. Department of Commerce, National Bureau of Standards. The meshes in the sieves below comply with similar specifications for 1-inch and ½-inch woven-wire cloth as set forth in the same publication. The sides of each sieve are formed, in a raised rim, from ¾-inch x ½-inch

metal strap. The frame has tracks made of $\frac{3}{8}$ -inch angle metal to support each sieve under each side. The tracks are so positioned as to permit each sieve a free vertical travel of $1\frac{1}{4}$ inches.

(d) If canned tuna falls below the applicable standard of fill of container prescribed in paragraph (a) of this section, the label shall bear the general statement of substandard fill provided in § 10.3 (b) of this chapter, in the manner and form therein specified.

Any person who will be adversely affected by the foregoing order may at any time prior to the thirtieth day from the date of its publication in the FEDERAL REGISTER file with the Hearing Clerk, Department of Health, Education, and Welfare, Room 5440, 330 Independence Avenue SW., Washington 25, D. C., written objections thereto. Objections shall show wherein the person filing will be adversely affected by the order, shall specify with particularity the provisions of the order deemed objectionable and the grounds for the objections, and shall

request a public hearing on the objections. Objections may be accompanied by a memorandum or brief in support thereof. All documents shall be filed in quintuplicate.

Effective date. The definition and standard of identity (§ 37.1) promulgated by this order shall become effective one year after its publication in the FEDERAL REGISTER, and the standard of fill of container (§ 37.3) promulgated by this order shall become effective 90 days after its publication in the FEDERAL REGISTER, except in each case any provisions that may be stayed by the filing of exceptions thereto. Notice of the filing of objections, or lack thereof, will be announced by publication in the FEDERAL REGISTER.

(Sec. 701, 52 Stat. 1055, as amended; 21 U. S. C. 371)

Dated: February 7, 1957.

[SEAL]

JOHN L. HARVEY,
Deputy Commissioner
of Food and Drugs.



Eighty-Fifth Congress (First Session)

Listed below and on the following pages are public bills and resolutions that directly or indirectly affect the fisheries and allied industries. Public bills and resolutions are shown when introduced; from month to month the more pertinent reports, hearings, or chamber actions on the bills shown are published; and if passed, they are shown when signed by the President.



ANTIDUMPING ACT OF 1921: H. R. 6006

(Cooper) and H. R. 6007 (Reed) introduced in the House March 14, bills to amend certain provisions of the Antidumping Act, 1921, to provide for greater certainty, speed, and efficiency in the enforcement thereof, and for other purposes; to the Committee on Ways and Means. Similar in purpose to H. R. 5120 (Forand), also: H. R. 5138 (Mack of Washington) and H. R. 5139 (Mason) all introduced in the House February 20. In the various bills there are some differences in the wording and methods suggested for determining the value of imports suspected of violating the Antidumping Act of 1921. See *Commercial Fisheries Review* March 1957, p. 59 for other bills on this subject.

COMMERCIAL PRODUCTION OF FISH ON RICE LANDS: S. 1552 (Fulbright) introduced in the Senate on March 12, a bill to authorize the Secretary of Agriculture to establish a program for the purpose of carrying on certain research and experimentation to develop methods for the

commercial production of fish on flooded rice acreage in rotation with field rice crops, and for other purposes; to the Committee on Agriculture and Forestry. This bill authorizes the Secretary of Agriculture to contract with the University of Arkansas for the establishment of an experiment station or stations within the State of Arkansas for the purpose of carrying on a program of research and experimentation on the stocking, harvesting, and marketing of fish crops produced on rice acreage. The Secretary of Agriculture is authorized to request the assistance of the U. S. Fish and Wildlife Service in carrying out the provisions of the Act.

"EXEMPT TRUCK" TO BE LIMITED: H. R. 5823 (Harris) introduced in the House on March 11, a bill to amend section 203 (b) (6) of the Interstate Commerce Act, as amended; to the Committee on Interstate and Foreign Commerce. The section to be amended will read as follows: motor vehicles used in carrying property consisting of ordinary livestock, live poultry, fish (including shellfish), or agricultural (including horticultural) commodities (not including manufactured products thereof or frozen foods) from the point of production to a point where such commodities first pass out of the actual possession and control of the producer, if such motor vehicles are not at the same time used in carrying any other property, or passengers for compensation. The point of production for fish shall be deemed to be the wharf or other landing place at which the fisherman debarks his catch, and the point of production for agricultural commodities shall be the point at which grown, raised or produced, or the point at which the fish or agricultural commodities are gathered for shipment.

This bill, if passed, would limit the use of "exempt truck" to a few cases of fish and shellfish transportation from the producer to the first processor or handler. Fresh and frozen fish and shellfish reshipped by the first processors or

TITLE 21—FOOD AND DRUGS

Chapter I—Food and Drug Administration, Department of Health, Education, and Welfare

PART 37—FISH; DEFINITIONS AND STANDARDS OF IDENTITY; STANDARDS OF FILL OF CONTAINER

ORDER ACTING ON PROPOSAL TO ADOPT DEFINITION AND STANDARD OF IDENTITY AND STANDARDS OF FILL OF CONTAINER FOR CANNED TUNA FISH

Correction

In F. R. Document 57-1079, of the issue for Wednesday, February 13, 1957, at page 892, make the following insertion in the last line of § 37.1 (f) (6): Preceding the words "bell peppers" insert the word "red".

handlers would be excluded. Also: introduced March 21: S. 1669 (Magnuson); to the Committee on Finance and similar to H. R. 5823 (Harris).

FISH HATCHERIES: S. 1784 (Young) introduced in the Senate April 4, a bill to provide for the establishment of a fish hatchery in the State of North Dakota; to the Committee on Interstate and Foreign Commerce. Bill provides for the construction of a fish hatchery on the Missouri River below Garrison Dam.

FISHING VESSEL RIGHTS ON THE HIGH SEAS: H. R. 5886 (Tollefson) and H. R. 5888 (Wilson), similar bills introduced in the House on March 12, to amend the Act of August 27, 1954 (68 Stat. 883), relating to the rights of vessels of the United States on the high seas and in the territorial waters of foreign countries; also H. R. 5943 (Magnuson) introduced in the House March 13; all referred to Committee on Merchant Marine and Fisheries (see also Commercial Fisheries Review, March 1957, p. 59). Hearings on the House bills were scheduled to be held on April 17 before the House Subcommittee on Fisheries and Wildlife Conservation.

EQUAL PAY FOR WOMEN: H. R. 6318 (Harden) introduced in the House on March 25, a bill to prohibit discrimination on account of sex in the payment of wages by employers having employees engaged in commerce or in the production of goods for commerce, and to provide for assisting such employees in collecting wages lost by reason of any such discrimination; also: S. 1807 (Morse and others) introduced in the Senate April 4, and H. R. 6797 (Roosevelt) introduced in the House April 10 (see Commercial Fisheries Review, February 1957, p. 63 for list of other bills introduced on this subject); all House bills referred to the Committee on Education and Labor and the Senate bill to the Committee on Labor and Welfare.

IMPORT AGREEMENTS: H. R. 6123 (Ashmore), H. R. 6140 (McMillan), H. R. 6153 (Lanham), introduced in the House March 19, bills to require that all agreements and understandings respecting the importation of foreign goods, entered into with foreign countries or their citizens, shall be reduced to writing and made public; also: introduced in the House March 20, H. R. 6195 (Dorn of South Carolina); March 25, H. R. 6330 (Riley); April 2, H. R. 6579 (Rivers). (See Commercial Fisheries Review, March 1957 p. 59 for additional bills); all the above bills referred to the Committee on Ways and Means.

IMPORT QUOTAS: H. R. 5828 (Hemphill) and H. R. 5829 (Hemphill) introduced in the House on March 11, bills to regulate the foreign commerce of the United States by establishing import quotas under specified conditions, and for other purposes; also: introduced in the House March 20, H. R. 6205 (Mack of Washington); March 25, H. R. 6425 (Moore); April 2, H. R. 6564 (Cederberg)--all referred to the Committee on Ways and Means. (See Commercial Fisheries Review, February 1957, p. 64, and March 1957, p. 59 for additional bills on the same subject).

INCOME TAX LAW REVISION IN FAVOR OF FISHERMEN: S. 1669 (Magnuson) introduced in the Senate of March 21, a bill to extend to fisher-

men the same treatment accorded to farmers in relation to estimated income tax; to the Committee on Finance. This bill proposes to amend Section 6073 (b) of the Internal Revenue Code of 1954 (relating to time for filing declarations of estimated income tax by farmers) by inserting "or fishing" after "from farming (including oyster farming)" wherever these words appear in the Code. The amendment, if made into law, will apply to taxable years after 1956. Also: introduced in the Senate on March 21, S. 1669 (Magnuson); to the Committee on Finance. See Commercial Fisheries Review, February 1957, p. 64, for additional bills on this subject.

MARINE LABORATORY IN FLORIDA: H. R. 6420 (Herlong) introduced in the House on March 27, a bill to provide for the construction of a fish and wildlife marine laboratory and experiment station in Brevard County, Fla.; to the Committee on Merchant Marine and Fisheries. (See Commercial Fisheries Review, February 1957, p. 65 for other bills on same subject.)

MINIMUM HOURLY WAGE: H. R. 6413 (Flood) introduced in the House March 27, a bill to amend the Fair Labor Standards Act of 1938 to fix the minimum wage at \$1.25 an hour; to the Committee on Education and Labor. (See Commercial Fisheries Review, February 1957, p. 65 for additional bills on this subject).

SMALL BUSINESS ACT AMENDMENT: S. 1762 (Sparkman) introduced in the Senate on March 29, a bill to further amend the Small Business Act of 1953, as amended; to the Committee on Banking and Currency. This bill provides for the following: (1) the agency would be made permanent; (2) the Loan Policy Board would be abolished; (3) the Agency's procurement powers would be strengthened; (4) certain authority now confined to wartime would be extended to periods of peace; (5) maximum loan limit would be raised from \$250,000 to \$500,000; (6) an insured loan plan, to be administered by the Small Business Administration, is included as a separate title of the bill. See Commercial Fisheries Review, February 1957, p. 66 for related bill S. 720 (Sparkman and others). This bill differs in some respects from the Sparkman bill.

SMALL BUSINESS ADMINISTRATION PERMANENT STATUS: S. 1789 (Thye and others) introduced in the Senate on April 4, a bill to amend the Small Business Act of 1953 (Title II of Public Law 163, 83rd Congress, as amended); to the Committee on Banking and Currency. This bill proposes to rewrite the Small Business Act and establish the Small Business Administration as a permanent agency of the Government.

SMALL BUSINESS INTERNAL REVENUE CODE: H. R. 5955 (Berry) introduced in the House on March 13, a bill to amend the Internal Revenue Code to assist small and independent business, and for other purposes; referred to the Committee on Ways and Means. Among other provisions, this bill provides for an election for filing income tax returns for small and independent business engaged in trade or commerce whether or not such business operate as individuals, partnerships, or corporations. Also provides for a normal tax rate of 20 percent for taxable years after March 31, 1957.

and to increase the surtax exemption, which will be increased from \$25,000 to \$150,000. Another provision which may be of value to the fishing industry is a 5-year depreciation allowance if the average taxable income for 5 preceding years does not exceed \$50,000 per year. This provision would allow fishing vessel owners to depreciate vessels' and vessel equipment much faster during periods of good profits.

SMALL BUSINESS LOANS FOR AREAS IN ECONOMIC DISTRESS: H. R. 6144 (Porter) introduced in the House March 19, a bill to amend the Small Business Act of 1953 to authorize loans by the Small Business Administration in areas of economic disaster, depression, or dislocation; to the Committee on Banking and Currency.

SMALL BUSINESS LOAN FOR NONPROFIT ORGANIZATIONS: H. R. 6148 (Porter) introduced in the House March 19, a bill to amend the Small Business Act of 1953 to authorize the Small Business Administration to make loans to local non-profit organizations formed to assist, develop, and expand the economy of the area; to the Committee on Banking and Currency. See *Commercial Fisheries Review*, March 1957, p. 60 for similar bill H. R. 5693 (Coffin) introduced March 6.

SOCKEYE SALMON FISHERY ACT: H. R. 6587 (Tollefson) introduced in the House on April 2, a bill to amend the Sockeye Salmon Fishery Act of 1947; to the Committee on Merchant Marine and Fisheries. Also: introduced in the Senate April 4: S. 1806 (Magnuson and Jackson) and referred to Committee on Interstate and Foreign Commerce. The Senate and House bills are similar and pro-

pose to amend the convention between the United States and Canada for the protection, preservation, and extension of the sockeye salmon (*Oncorhynchus nerka*) of the Fraser River system, to include pink salmon (*Oncorhynchus gorbuscha*).

TAX RELIEF FOR SMALL BUSINESS: H. R. 6407 (Alger) introduced in the House March 27, a bill to provide a minimum initial program of tax relief for small business and for persons engaged in small business. Also: introduced in the House March 28: H. R. 6465 (Rhodes); introduced in the Senate April 8: S. 1820 (Potter). Both House bills to the Committee on Ways and Means and Senate bill to the Committee on Finance. Provides for amendment to Internal Revenue Code of 1954 for increased deduction for additional investment in depreciable assets and inventory. The deduction shall not exceed for any taxable year (whichever is lesser) \$30,000 or an amount equal to 20 percent of the net income of a trade or business for the taxable year. Another amendment concerns tax-anticipation certificates for Federal estate tax.

TRADE AGREEMENTS EXTENSION ACT: S. 1796 (Watkins) introduced in the Senate April 4, a bill to amend the Trade Agreements Extension Act of 1951 with respect to escape clause procedure, and for other purposes; to the Committee on Finance. This bill proposes to assist some business industries, which have been adversely affected by heavy imports. The amendment would empower the President to limit imports of specific products if they became large enough to threaten an industry vital to the national security.



DRIP IN FROZEN FROG LEGS

The amount of free "drip" in frozen and subsequently thawed frogs is not proportional to the quantity of water which is imbibed by the muscle tissue before freezing. The amount of water imbibed by legs of bullfrogs (*Rana catesbeiana* Shaw), from which the skin was removed immediately after killing, when soaked for 2, 4½, and 24 hours in ice water before freezing, increased according to the length of the soaking time.

--*Modern Refrigeration*, August 1955
and Paper read at the Ninth International
Congress of Refrigeration, 1955.

FISHERY INDICATORS

CHART 1 - FISHERY LANDINGS for SELECTED STATES

In Millions of Pounds

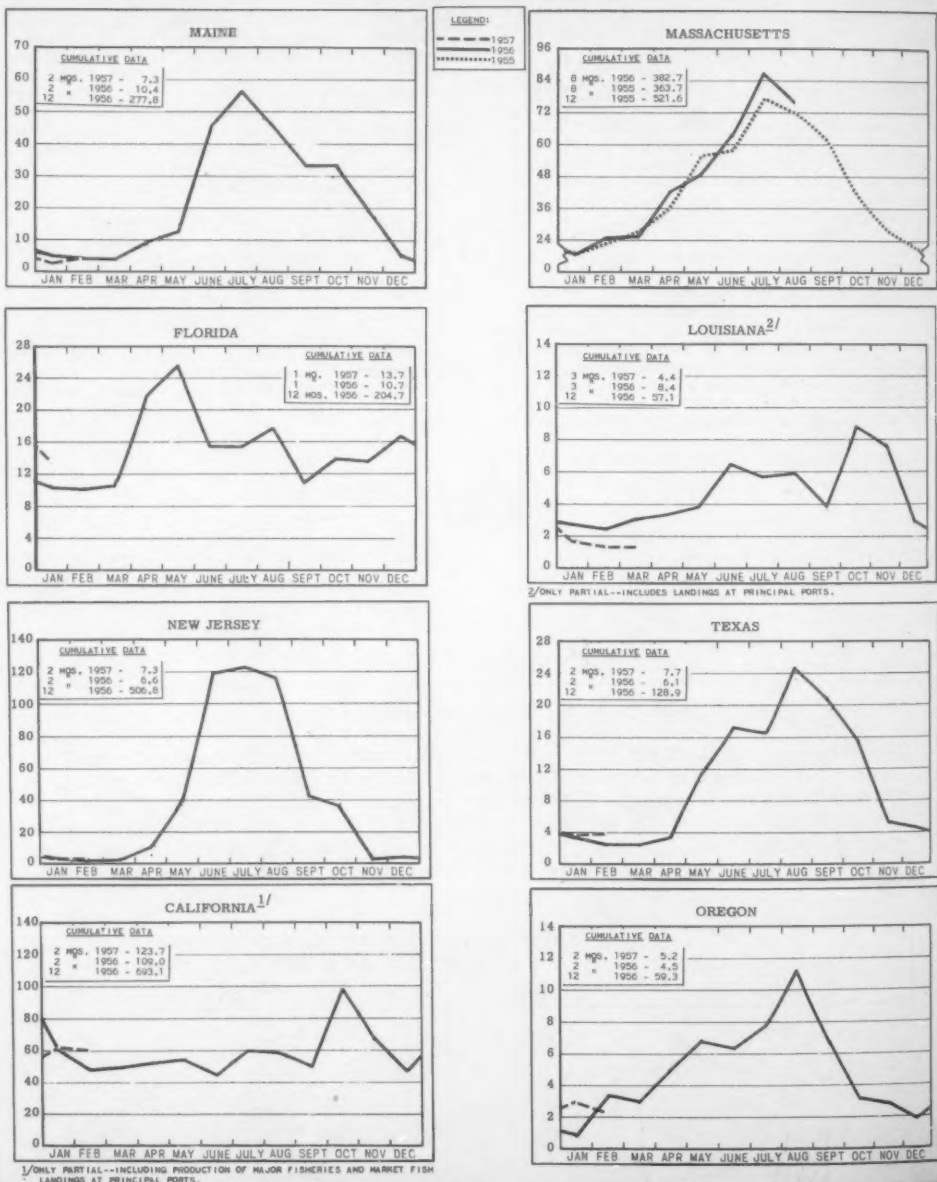
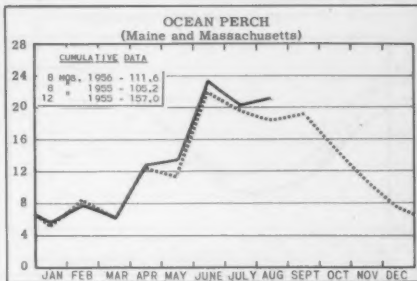
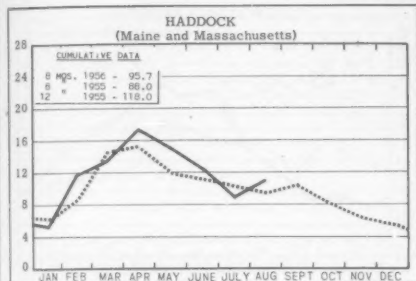
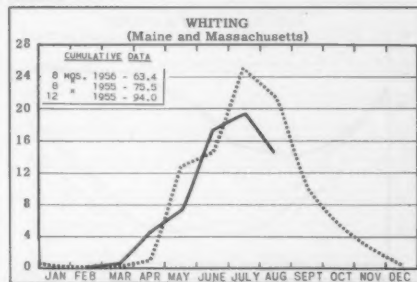
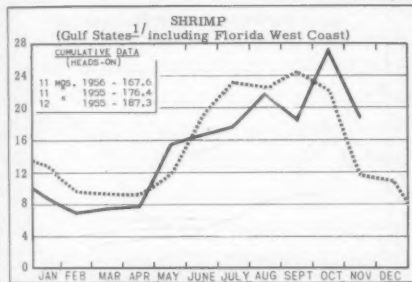


CHART 2 - LANDINGS for SELECTED FISHERIES

In Millions of Pounds

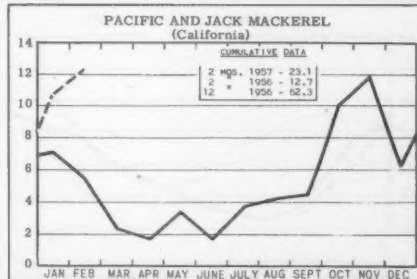
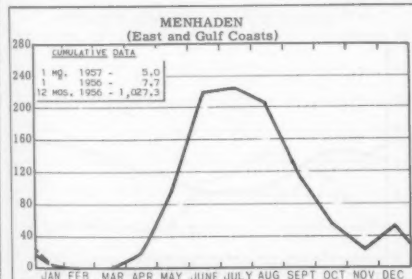


In Millions of Pounds

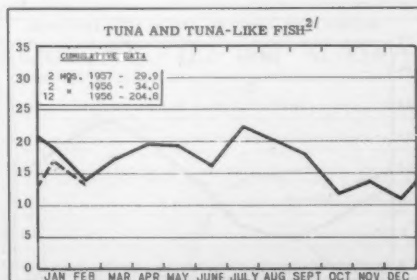
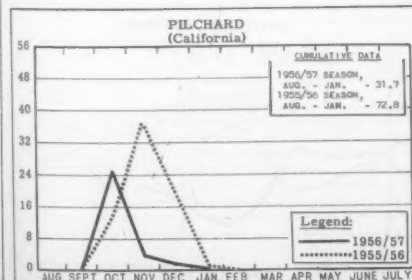


^{1/}LA. & ALA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.

In Thousands of Tons



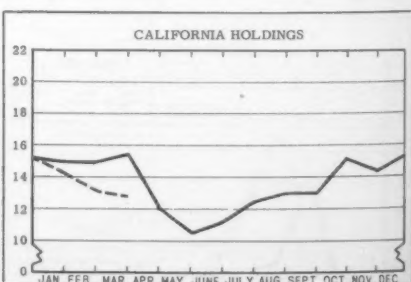
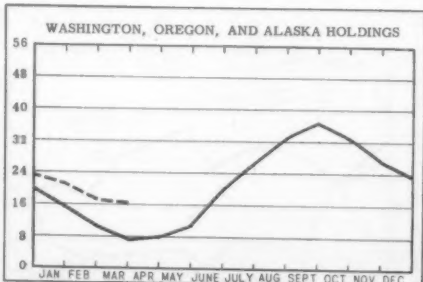
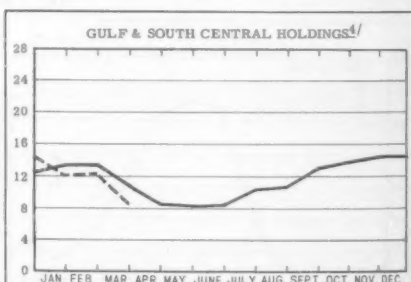
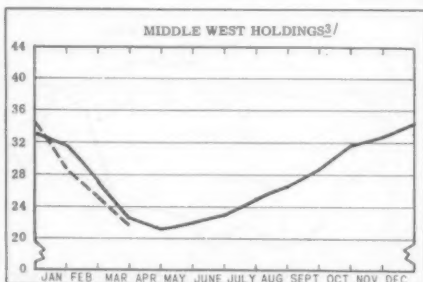
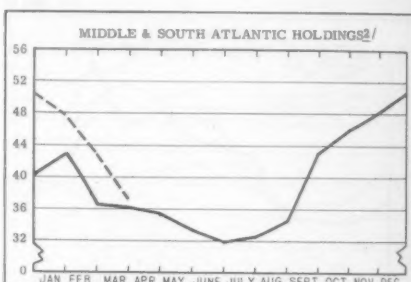
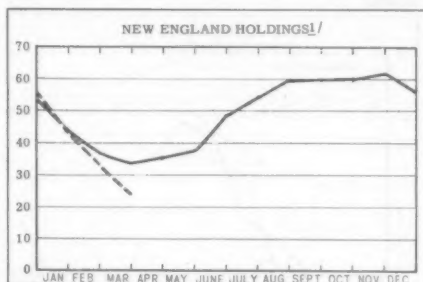
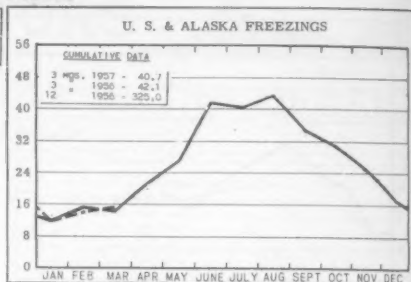
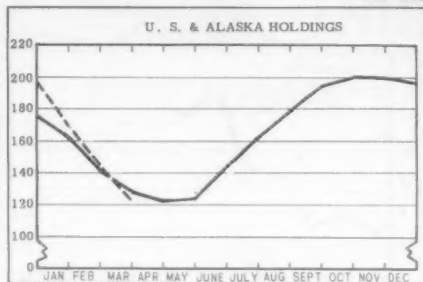
In Thousands of Tons



^{2/}RECEIPTS BY CALIFORNIA CANNERIES, INCLUDING IMPORTS.

CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

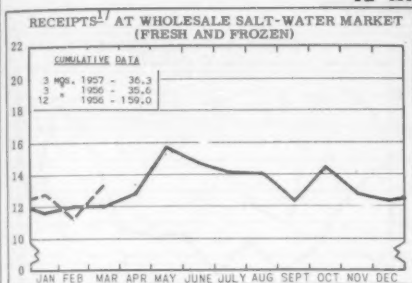
In Millions of Pounds



*Excludes salted, cured, and smoked products.

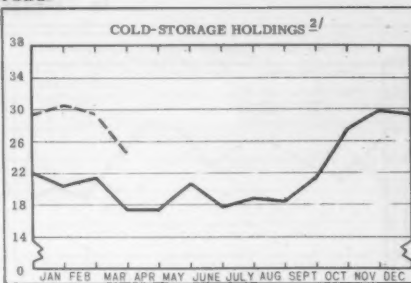
CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pounds

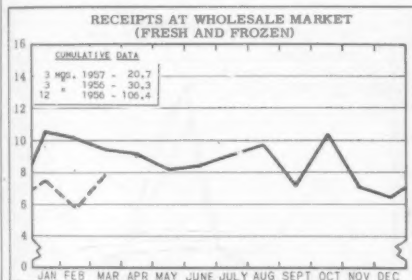


^{1/}INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.

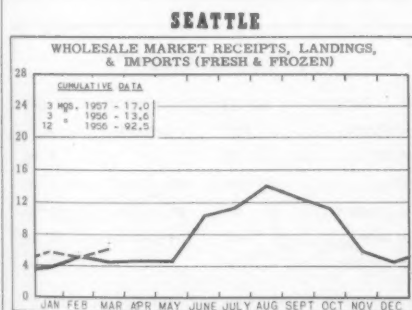
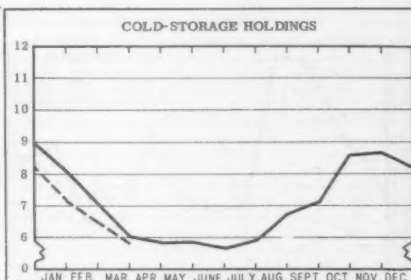
NEW YORK CITY



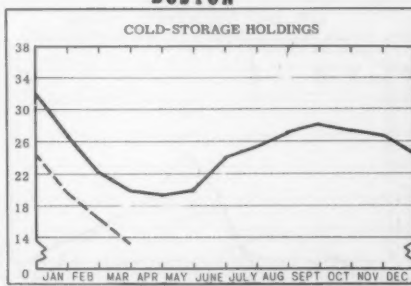
^{2/}AS REPORTED BY PLANTS IN METROPOLITAN AREA.



CHICAGO



BOSTON



LEGEND:
--- 1957
--- 1956

CHART 5 - FISH MEAL and OIL PRODUCTION - U.S. and ALASKA

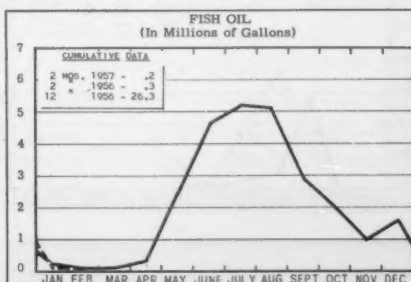
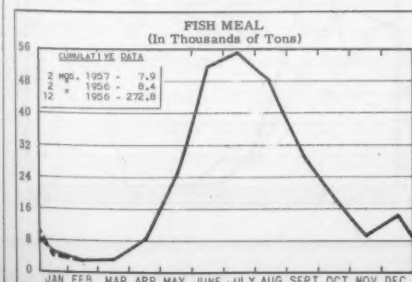
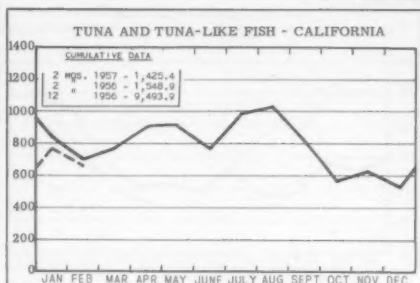
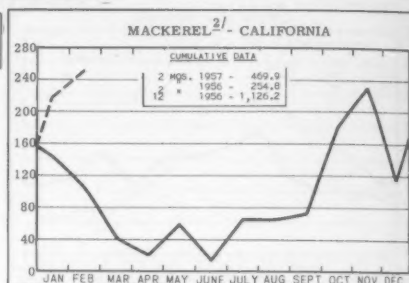


CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

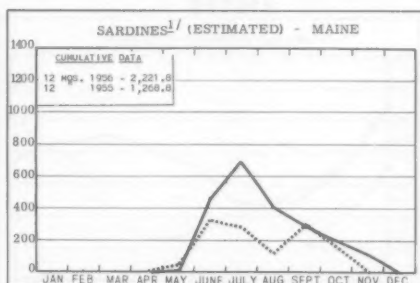
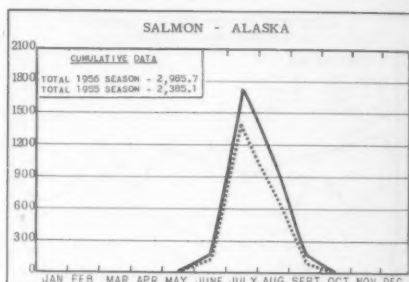
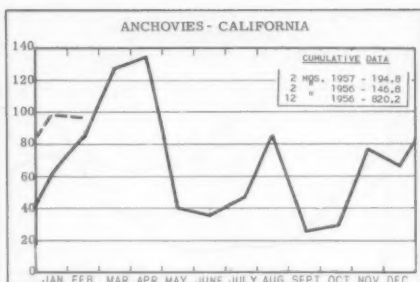
In Thousands of Standard Cases



LEGEND:
--- 1957
— 1956

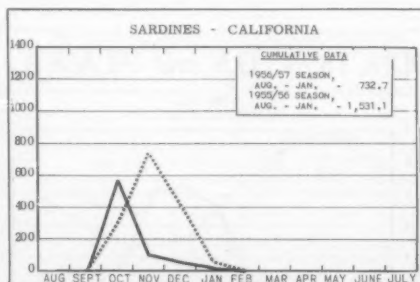


^{2/}INCLUDES PACIFIC MACKEREL AND JACK MACKEREL.



^{1/}INCLUDING SEA HERRING.

STANDARD CASES			
Variety	No. Cans	Can Designation	Net Wgt.
SARDINES	100	$\frac{1}{2}$ drawn	$3\frac{1}{2}$ oz.
SHRIMP	48	--	5 oz.
TUNA	48	No. $\frac{1}{2}$ tuna	6 & 7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
SALMON	48	1-pound tall	16 oz.
ANCHOVIES	48	$\frac{1}{2}$ lb.	8 oz.



Legend:
— 1956/57
----- 1955/56

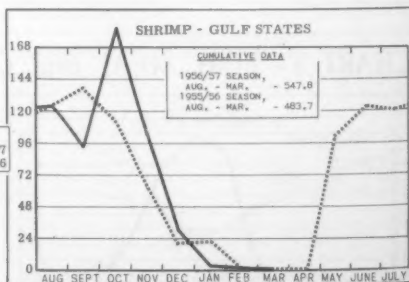
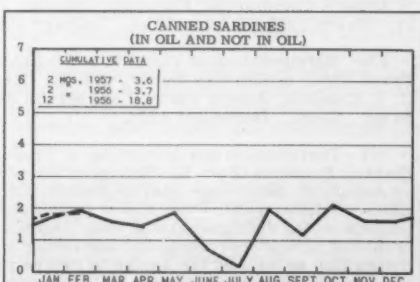
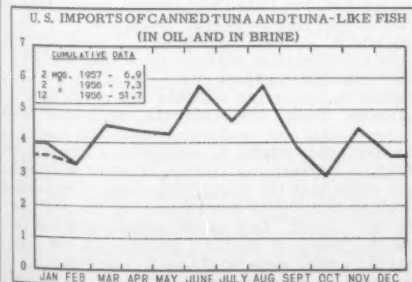
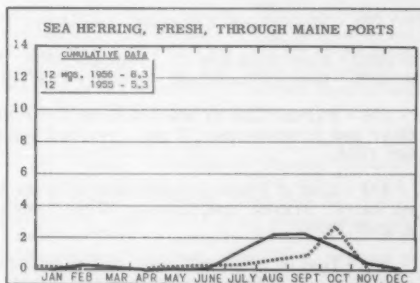
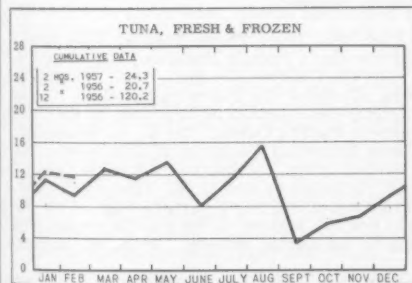
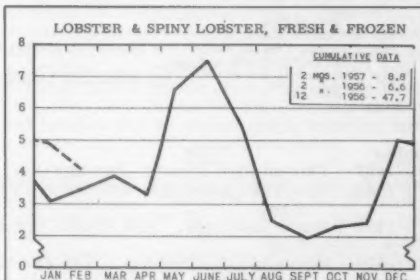
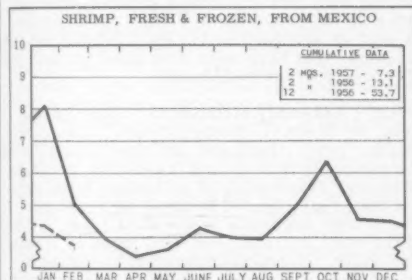
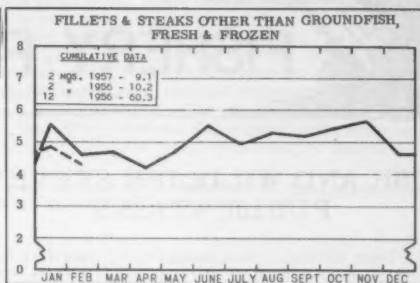
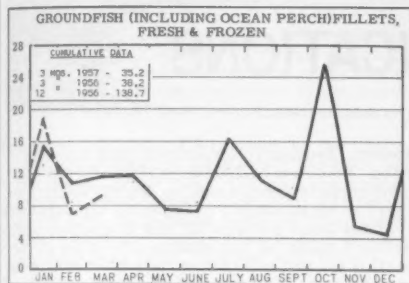
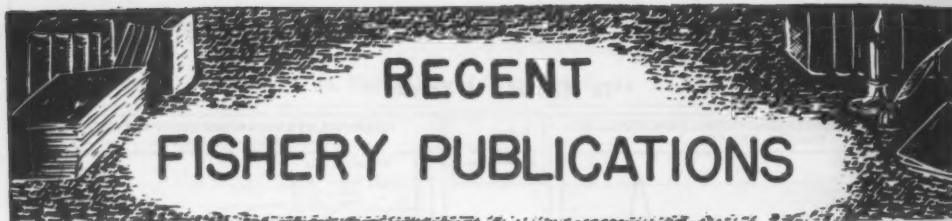


CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds





FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
- FL - FISHERY LEAFLETS.
- SSR - FISH - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
- SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

- | Number | Title |
|------------|--|
| CFS-1487 | - Frozen Fish Report, January 1957, 8 pp. |
| CFS-1489 | - New York Landings, December 1956, 4 pp. |
| CFS-1493 | - Maine Landings, 1956 Annual Summary, 5 pp. |
| CFS-1494 | - Rhode Island Landings, 1956 Annual Summary, 6 pp. |
| CFS-1497 | - Maine Landings, 1956 Annual Summary, 11 pp. |
| CFS-1498 | - Mississippi Landings, December 1956, 2 pp. |
| CFS-1501 | - Fish Meal and Oil, January 1957, 2 pp. |
| CFS-1506 | - Georgia Landings, January 1957, 2 pp. |
| FL - 195 | - Partial List of Manufacturers of Fishing Gear and Accessories, 12 pp., revised September 1956. |
| FL - 254 | - List of Fishery Associations in the United States, Alaska, and Hawaii, 12 pp., revised August 1956. |
| FL - 292 | - List of Fishery Cooperatives in the United States and Alaska, 5 pp., revised August 1956. |
| FL - 336ee | - Commercial Fisheries Outlook, January-March 1957, 41 pp., illus., January 1957. |
| FL - 428 | - Refrigeration of Fish, Part 2--Handling Fresh Fish, by Charles Butler, John A. Dassow, C. J. Carlson, Joseph Carver, and Martin Heerd, 84 pp., illus., December 1956. |
| FL - 431 | - Distribution and Marketing of Frozen Fishery Products (Part V--Refrigeration of Fish), by Joseph W. Slavin and Martin Heerd, 78 pp., illus., October 1956. Part V of a series of five leaflets on the refrigeration of fish. Deals with problems of transportation and marketing of frozen fish as well as the design of locker plants and home freezers for storage of the frozen |

product. Section 1, concerned with transportation, takes up railroad, truck and ship distribution practices as well as the different systems for maintenance of freezing temperatures that have been evolved for use in each practice. Section 2 takes up the quality problems at the retail level and offers methods of checking the prior history and consequently the quality level of the product at the point of sale. Section 3, dealing with locker plants and home-freezers, takes up the problems of design requirements as well as suggestions for good product handling practices that have been developed for both types of frozen storage equipment.

FL - 437 - Assembly Methods for Otter-Trawl Nets, by Boris O. Knake, 29 pp., illus., December 1956. Illustrates and describes in detail the assembly of standard trawl nets, methods of lacing, assembling of an Iceland trawl net, and the proper way of bending the trawl net. The proper assembly of the otter trawl is one of the most difficult problems faced by trawler fishermen. Correctly operated, the trawl is an extremely efficient fishing device; when improperly hung or operated, its efficiency is greatly reduced.

SSR-Fish. No. 192 - Three Russian Papers on Northwestern Pacific Plankton, translated by W. G. Van Campen, 24 pp., illus., October 1956. Contains the following articles: "On the Vertical Distribution of Copepods in the Northwestern Pacific Ocean," by K. A. Brodskii; "Some Essential Features of Zooplankton Distribution in the Northwestern Pacific Ocean," by V. G. Bogorov and M. E. Vinogradov; and "Plankton of the Northwestern Part of the Kuroshio and the Waters of the Pacific Ocean Adjacent to the Kurile Islands," by K. A. Brodskii.

SSR-Fish. No. 194 - Preparation of a Dry Product from Condensed Menhaden Solubles: Statistical Analysis of the Data (Supplement to the Fish and Wildlife Service Research Report 45), by C. F. Lee and R. J. Monroe, 23 pp., December 1956. Simple correlation studies show that 4 of 10 chemical and physical characteristics are important in preparing suitable dry condensed solubles. These are ammonia, corrected protein content, total ash, and water insoluble matter, and desirable limits are suggested for each. Multiple correlation studies of other selected data show that the specific gravity of condensed solubles is largely determined by its total ash and fat content. Dry solids content and the refractive index or specific gravity are not correlated either separately or in combination. The study indicates that the variability in com-

position of condensed solubles does not account for either the extreme variation in viscosity of the condensed solubles or for differences in moisture-absorptive characteristics of the related dry solubles. By means of an analysis of variance it was shown that the solubles produced by plants in the South Atlantic and Gulf of Mexico areas differed in composition from the product of plants in the Central Atlantic area. Otherwise, there were not sufficient data to permit determination of the effect of type of plant or of the month of production upon the properties of the condensed solubles.

SSR-Fish. No. 196 - Collections by the Oregon in the Gulf of Mexico, by Stewart Springer and Harvey R. Bullis, Jr., 137 pp., December 1956. A list of crustaceans, mollusks, and fishes identified from collections made by the exploratory fishing vessel Oregon in the Gulf of Mexico and adjacent seas from 1950 through 1955.

SSR-Fish. No. 200 - Canned Fish and Shellfish Preferences of Household Consumers, 1956, 332 pp., illus., February 1957. A report on a June 1956 nationwide survey pertaining to the use of canned fish and shellfish products by household consumers and their specific preferences, demands, likes, and dislikes affecting the actual and potential market for these products. The canned fish and shellfish industry is confronted with many economic and market problems. This survey was conducted to find the answers to some of these problems. Because of changes in income and standards of living among the masses of lower income consumers, many families are up-grading the types of fishery products they use. The competition of imported products and domestic oversupply are often depressing factors on canned fishery products markets. The industry is faced with a pressing need for expanding markets. At the same time, partly because of the fragmentation of the industry into many small firms which are unable to conduct any basic marketing research, it is handicapped by insufficient knowledge of consumer demand and buying practices. This survey was designed to provide information which will help the domestic fishing industry with its production and marketing problems. Survey results indicate that canned fish, or shellfish, is not directly competitive in any considerable degree with fresh or frozen fish or shellfish. While the use of canned fish or shellfish was quite stable, there existed a variation in relationship between fresh and frozen fish as influenced by geographic location and availability of fresh fish and other factors. Further results are discussed in a summary of major findings. Survey methods and tabulations of responses to questionnaires are included. A graphic version of some of the more important findings of the survey is presented in Circular 45, "Household Consumer Preferences for Canned Fishery Products, 1956."

Survey of Sport Fishery Projects, 1956, Circular 46, 185 pp., January 1957. This circular is the third catalog of sport-fishery programs in the United States. Its objective is to provide fishery administrators, teachers, research workers, and managers a means of keeping abreast of current work in fish conservation and restoration activities. The subjects covered are: acquisition of fishing waters; age and growth; aquatic vegetation

control; creel census; dams and diversions; disease and parasites; distribution of fishes; economics of sport fishery; fertilization; fish culture; food studies; lake and pond construction; lake improvement; lake investigations; life history studies; marine investigations; movement and migration; pollution; pond investigations; population investigations; rehabilitation of lakes, ponds, reservoirs, and streams; reservoir investigations; rough fish control; stocking; stream investigations and improvements; surveys; techniques and equipment; and watershed management.

Sep. No. 472 - Bottom Trawling Exploration in the Strait of Juan de Fuca--February to March 1956.

THE FOLLOWING SERVICE PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

Landings and Prices of Fishery Products, Boston Fish Pier, 1956 (Includes "Trends in the Fishing Industry at Boston"), by John J. O'Brien, 25 pp., processed, 1957. (Available free from the Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston 10, Mass.) Fish marketing trends and conditions in Boston for 1956 are discussed. Detailed data on landings and ex-vessel prices of fish and shellfish at the Boston Fish Pier during 1956 are presented. Statistics are given by months and species and by type of gear, together with comparative data for previous years.

Means to Restore and Increase the Runs of Kamchatka Salmon, translated by C. E. Atkinson, Translation Series No. 11, 8 pp., illus., processed. (Edited translation from *Ichthyological Commission, Transactions of Conferences No. 4, 1954*, pp. 10-13, Academy of Sciences, U. S. S. R., Moscow, Russia.) U. S. Fish and Wildlife Service Laboratory, Seattle, Wash., April 1956. Discusses the causes for the sharp decrease in the number of red salmon in the Kamchatka River and the decline in the size of the spawning runs of the Far Lake red salmon. Also discusses the Kamchatka salmon studies and plans to increase production.

POFI--Progress in 1956, by A. L. Tester and Staff, 33 pp., illus., processed. (Pacific Oceanic Fishery Investigations, U. S. Fish and Wildlife Service, Honolulu, Hawaii), February 18, 1957. The purpose of this report is to summarize for the benefit of POFI's Industry Advisors the accomplishments of the past year and to present and discuss new ideas and hypotheses regarding the tuna populations of the Pacific. Even though these ideas and hypotheses are in an undeveloped or formative stage, they serve as guidelines for future research. Results of POFI's work for 1956 are discussed under the following major headings: equatorial tuna investigations; Hawaiian skipjack investigations; albacore investigations; sea scanar; contract research; foreign literature; publications; and manuscripts completed.

(Chicago) December 1956 Monthly Summary of Chicago's Fresh and Frozen Fishery Products Receipts and Wholesale Market Prices, 10 pp. (Market News Service, U. S. Fish and Wildlife Service, 565 W. Washington St., Chicago 6, Ill.) Receipts at Chicago by species and by states and provinces; fresh-water fish, shrimp,

and frozen fillet wholesale market prices; for the month indicated.

Gulf Monthly Landings, Production, and Shipments of Fishery Products, February 1957, 5 pp., (Market News Service, U. S. Fish and Wildlife Service, 609-611 Federal Bldg., New Orleans 12, La.) Gulf states shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; and wholesale prices of fish and shellfish on the New Orleans French Market; for the month indicated.

(Seattle) Monthly Summary - Fishery Products, February 1957, 6 pp. (Market News Service, U. S. Fish and Wildlife Service, 421 Bell St. Terminal, Seattle 1, Wash.) Includes landings and local receipts, with ex-vessel and wholesale prices in some instances, as reported by Seattle and Astoria (Oregon) wholesale dealers; also Northwest Pacific halibut landings; for the month indicated.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

How to Cook Crabs, by Dorothy M. Robey and Rose G. Kerr, Test Kitchen Series No. 10, 17 pp., illus., printed, 20 cents, 1956. This booklet contains 32 choice recipes which have been developed and kitchen-tested by the Service's staff of home economists. As the booklet explains, four principal kinds of crabs are taken from the marine waters of the United States and Alaska. From the Atlantic and Gulf coasts come blue crabs which compose three-fourths of all the crabs marketed in this country. Dungeness crabs are found on the Pacific coast from Alaska to Mexico. King crabs come from the North Pacific off Alaska. Rock crabs are taken on the New England and California coasts. Of local importance are stone crabs in Florida and tanner crabs in Alaska. The four principal kinds of crabs are pictured in the booklet and their approximate weights are listed. Complete, illustrated instructions are given for picking the meat from blue crabs. Some of the easy-to-prepare recipes included are: crab Louis, crab ravigote, crab newburg, deviled crab, imperial crab, avocados stuffed with crab meat, and barbecued crab sandwiches.

Observations on the Development of the Atlantic Sailfish ISTIOPHORUS AMERICANUS (Cuvier), with Notes on an Unidentified Species of Istiophorid, by Jack W. Gehringer, Fishery Bulletin 110 (From Fishery Bulletin of the Fish and Wildlife Service, vol. 57), 36 pp., illus., printed, 30 cents, 1956.

Tunas and Tuna Fisheries of the World: An Annotated Bibliography, 1930-53, by Wilvan G. Van Campen and Earl E. Hoven, Fishery Bulletin 111, 76 pp., printed, 45 cents. (Reprinted from Fishery Bulletin of the Fish and Wildlife Service, vol. 57, pp. 173-249.) A bibliography, with descriptive annotations and a subject index, which attempts to list important literature published between 1930 and 1953 dealing with tunas and their fisheries in all parts of the world. All aspects of the biology of the tunas are dealt with, as are descriptions and histories of all types of tuna fisheries, commercial and exploratory tuna fishing methods and results, fishing gear, catch

statistics, and fishery management. Processing technology, economics and marketing, folklore, and purely literary references have been excluded.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

ARGENTINA:

Memoria y Balance (Report and Balance Sheet), 53rd Season ending June 30, 1956, 18 pp., printed in Spanish. Compania Argentina de Pesca, S. A., 25 de Mayo 460, Buenos Aires, Argentina, December 27, 1956. Annual report of fishery developments, commercial prospects, and finances of the Argentine Fishery Co., Inc. for the period July 1, 1955 to June 30, 1956. Discusses, among other subjects, a proposal to abandon whaling because it has become unprofitable.

BELGIUM:

Moniteur du Poisson (The Fish Monitor), illus., printed. Redaction et Administration, Rue Verte 53, Anvers, Belgium. A monthly magazine printed in French and devoted to the fishing industry. This specialized magazine is something new, touching on everything and anything that concerns the fishing industry. The first issue (November 1956) presents a historical summary of the development of the canned fishery products industry in Portugal and includes statistics on exports of canned fishery products. The December issue was to be devoted entirely to the fishing industry of Denmark, and the January issue was to be compiled in close cooperation with the Bureau of Maritime Fishing for the Belgian Congo.

BIOCHEMISTRY:

"The Amino Acid Composition of Fish Collagen and Gelatin," by J. E. Eastoe, article, The Biochemical Journal, vol. 65, no. 2, February 1957, pp. 363-368, printed, single copy \$4.25. Cambridge University Press, 32 East 57th St., New York 22, N. Y.

BRAZIL:

Producao de Conserva, Salga e Oleo de Peixe (Production of Canned Fish, Seasoned, and Fish Oil), 37 pp. of tables, processed in Portuguese. Servico de Estatistica da Producao, Ministerio da Agricultura, Rio de Janeiro, Brazil.

BYPRODUCTS:

Fabricacion de Harina de Pescado en Pequeña Escala (Manufacture of Fish Flour on a Small Scale), by Trygve Sparre, Technical Publication No. 2, 21 pp., illus., processed in Spanish. Ministerio de Agricultura, Direccion General de Pesca y Caza, Valparaiso, Chile, October 1956.

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Plantas Reductororas de Desperdicios de Pescado (Machines for Reducing Fish Waste), by Einar Sola, Technical Publication No. 3, 48 pp., illus., processed in Spanish. Ministerio de Agricultura, Direccion General de Pesca y Caza, Valparaiso, Chile, 1956. Describes the machinery and process used in the manufacture of fish flour from fish waste.

CANADA:

British Columbia Catch Statistics, 1956 (By Area and Type of Gear), 155 pp., illus., processed. Department of Fisheries of Canada, 1110 West Georgia St., Vancouver 5, B. C., Canada, February 4, 1957. The sixth annual report of fish-catch statistics for British Columbia based on Departmental copies of sales slips that are completed by all commercial fish buyers operating within the Province. Statistics are presented by species, months, gear, and area. The report is intended as a factual statement of catch and no attempt is made except in a general way to explain the success or failure of fishing operations. However, certain economic, weather, and conservation factors that have a bearing on the catch are reviewed.

Fisheries Statistics of Canada (Nova Scotia), 1954.

93 pp., printed in French and English, 50 Canadian cents. Queen's Printer and Controller of Stationery, Ottawa, Canada, 1957. Consists of tables giving the quantity and value of fish and shellfish landed in Nova Scotia, 1951-1954, by species and by fisheries districts; quantity and value of manufactured fishery products and by-products for 1953-54; capital equipment in primary operations; and number of persons engaged in the primary operations.

"Fishing Industry Looks to Science," article, Trade News, vol. 9, no. 7, January 1957, pp. 3-8, illus., printed. Department of Fisheries, Ottawa, Canada. On January 7-9 the Fisheries Research Board of Canada held its annual meeting in Ottawa. This article describes the meetings and the reports from the directors of the Board's stations and those heading special units. Investigations carried out during the past year and programs planned for the year ahead showed that ashore and afloat the research conducted by the Atlantic, Pacific, Central, and Arctic regions had covered a wide range of biological, technological, and hydrological aspects of the fisheries. In this article it was possible to touch but lightly on the wide ramifications of the Research Board's work. Some aspects are capable of producing conclusions within a reasonably short period of time, others by reason of the complexities involved must extend over many years. In their laboratories and workshops and on ships at sea, Canada's fisheries scientists day by day are accumulating the knowledge that will not only give the nation's fishermen the adequate standard of living that their labors deserve but will also advance the welfare of peoples of other lands who are coming to depend more and more on the harvests of the sea. On pages 9-11 of this issue of Trade News is the full text of an address, "Expansion of Fisheries Research," given by Deputy Minister of Fisheries G. R. Clark at the annual meeting of the Board. Dr. Clark salutes the

research staffs of the Board's various stations and discusses aid in industrial development, vessel and gear research, and pollution of waters.

Progress Reports of the Atlantic Coast Stations, no. 63, 23 pp., illus., printed in English and French. Queen's Printer, Ottawa, Canada, November 1955. Contains the following articles: "The Green Crab--A New Clam Enemy," by J. S. MacPhail, E. I. Lord, and L. M. Dickie; "Have Atlantic Salmon been Overfished?" by P. F. Elson; "Summer Surface Temperatures in the Canadian Atlantic," by W. B. Bailey; and "The Valleyfield-Badgers Quai Commercial Longlining Experiment, 1954," by H. D. Macpherson.

CLAMS:

The Maryland Soft Shell Clam Industry and Its Effects on Tidewater Resources, by J. H. Manning, Resource Study Report No. 11, 27 pp., illus., printed. Maryland Department of Research and Education, Chesapeake Biological Laboratory, Solomons, Md., January 1957. An interim report to the Maryland General Assembly including basic information concerning the soft shell clam, the industry it supports, the gear used in its exploitation, and the effects of that gear on tidewater resources. In addition, some of the proposals which have been made concerning the soft shell clam fishery are evaluated. All available evidence has been considered--statistical records, direct observations, and the results of the Department's and others' research. Much of the evidence is presumptive rather than conclusive, but sufficient to support certain estimates and reasoned judgments. The report is presented in 7 main divisions: (1) Design and operation of the hydraulic clam dredge; (2) Summary of knowledge of Maryland's soft shell clam resource; (3) Development and present status of the Maryland soft shell clam industry; (4) Potential value of the Maryland soft shell clam resource; (5) Effects of the hydraulic clam dredge on tidewater resources; (6) Evaluation of the effects of certain proposals concerning the soft shell clam industry; and (7) Summary.

CONSERVATION:

Fish Conservation Highlights of 1956, 178 pp., illus., printed. Sport Fishing Institute, Bond Bldg., Washington 5, D. C., 1957. A summary of accomplishments and important problems in fish conservation. The former established pattern of agency-by-agency narration of the year's work was abandoned in favor of summarizations organized by functions and kind of activity. Contains sections on the Dingell-Johnson program (Federal aid in fish restoration), resource development, special aspects of fish management, and management studies and basic research. Also contains the following articles: "The Fishery Biologist," by Charles C. Bowers, Jr.; "Boy Scouts in Fish Conservation," by Ted S. Pettit; and "Licensing Salt-Water Anglers," by Charles H. Callison and Richard H. Stroud.

CORSICA:

Problemes d'equipement de la peche en Corse (Problems of Equipment in Corsican Fishery),

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

by F. Doumenge, 19 pp., illus., printed in French. (Reprinted from *Bulletin de la Societe Languedocienne de Geographie*, vol. XXVII, no. 4.) Centre Regional de la Productivite et des Etudes Economiques, Rue de Verdun 22, Montpellier, France, 1956. Discusses traditions, problems, and possibilities for modernization of the fishery in Corsica.

DEPARTMENT OF THE INTERIOR:

1956 Annual Report of the Secretary of the Interior (For the Fiscal Year Ended June 30, 1956), 418 pp., illus., printed, \$1.25 (paper). U. S. Department of the Interior, Washington, D. C. (For sale by the Superintendent of Documents, Washington 25, D. C.) This publication contains the annual reports of the various agencies of the Department of the Interior, including the Fish and Wildlife Service. Included under Fish and Wildlife Service are summaries of its various activities. Specifically discussed are assistance to the commercial fisheries (describes the activities of the Branch of Commercial Fisheries); conservation of Alaska commercial fisheries; Pribilof Islands fur-seal industry; research in fishery biology (coastal, inland, and marine fisheries); maintenance of inland fisheries; Federal aid to states for the restoration of fish and wildlife; river basin development and wildlife needs; international cooperation in conservation (international technical cooperation and conservation agreements); and other activities.

EAST AFRICA:

East African Fisheries Research Organization Annual Report, 1955/1956, 32 pp., printed. East African Fisheries Research Organization, P. O. Box 343, Jinja, Uganda, 1956. This report covers the period from July 1, 1955, to June 30, 1956, and contains a general account of the work of the Organization and a list of the publications by staff members and visiting scientists. The following papers are also presented: "The Efficient Utilisation of the Fisheries of Lake Victoria," by R. S. A. Beauchamp; "The Distribution of Sulphur in the Muds, Water and Vegetation of Lake Victoria and Its Fixation in the Bottom Deposits," by P. R. Hesse; "Some Observations on Seasonal and Diurnal Changes of Stratification in Lake Victoria," by J. F. Talling; "The Planktonic Crustacea of Lake Victoria," by J. Rzoska; "Effects of D. D. T. on the Feeding Habits of Insectivorous Fishes in the Victoria Nile," by P. S. Corbet; "Ring Formation in the Scales of *Tilapia esculenta*," by D. J. Garrod; "Preliminary Note on Investigations being Undertaken on the Physiology of Reproduction in Fishes," by A. J. Marshall; and "Results Obtained from a Spectrographical Analysis of Bottom Deposits from Pilkington Bay," by C. T. Chamberlain.

LAMPREY:

"Artificial Propagation of the Sea Lamprey, *Petromyzon marinus*," by Robert E. Lennon, article, *Copeia*, no. 3, August 19, 1955, pp. 235-236, printed, single copy \$2.00. American Society of Ichthyologists and Herpetologists, Mt. Royal and Guilford Aves., Baltimore 2, Md.

FOOD AND AGRICULTURE ORGANIZATION:

Conservation et Distribution des Produits de la Peche (Conservation and Distribution of Fishery

Products), by Commandant Giorgio Ricci, FAO Technical Paper No. 43, 10 pp., processed in French. Food and Agriculture Organization of the United Nations, Rome, Italy, 1956. Recommends wider use of refrigerators and quick freezing since the use of ice is often insufficient to keep fish in good condition.

Transport of Fish for Short Trips by Sea at Medium Temperature, by Selim R. Suntur, FAO Technical Paper No. 47, 4 pp., processed. Food and Agriculture Organization of the United Nations, Rome, Italy, 1956.

The Food and Agriculture Organization has published reports describing that Agency's activities under the Expanded Technical Assistance Program for developing the fisheries of many countries. These reports have not been published on a sales basis, but have been processed only for limited distribution to governments, libraries, and universities. Food and Agriculture Organization, Viale delle Terme di Caracalla, Rome, Italy.

Informe al Gobierno del Ecuador sobre Fomento de la Pesca Maritima (Report to the Government of Ecuador on Marine Fishery Projects), by Dr. Erwin A. Schweigger, FAO Rpt. No. 325, 23 pp., processed in Spanish, January 1955. Reports on the fishery resources of Ecuador; equipment; the social level of the fisherman; surface fishery; specific problems of tuna and cod fisheries; and need for conservation measures; and lists the scientific, English, and Ecuadorian names of fish in Ecuador.

Informe al Gobierno de la Republica de Panama sobre Investigacion de los Recursos Camaroneros, Octubre 1952-Octubre 1953 (Report to the Government of Panama on Investigations of the Shrimp Resources, October 1952-October 1953), by Leslie W. Scattergood, FAO Rpt. No. 326, 70 pp. and 6 plates of photographs, processed in Spanish, March 1955. Discusses the objective of study, fishery history, and importance of shrimp in Panama; the shrimp fleet; shrimp fishery zones and oceanography; and methods of identification and measurement, and observations and distribution of commercial species of shrimp.

Informe al Gobierno de la Republica Dominicana sobre Piscicultura (Report to the Government of the Dominican Republic on Fish Culture), by S. Y. Lin, FAO Rpt. No. 346, 11 pp. and 5 plates of plans and photographs, processed in Spanish, December 1954. Discusses proposed plans for establishing needed fish hatcheries throughout the Dominican Republic.

Report to the Government of India on the Development of the Sundarbans Fisheries in West Bengal, based on work done by W. F. L. van der Heyden, FAO Rpt. No. 347, 15 pp. and 10 drawings and photographs, processed, December 1954. Reports on fishing gear, methods, and craft used in Sundarbans fisheries; transport and marketing of fish; experimental fishing project; and floating ice plant and cold storage.

Report to the Government of Turkey on Fishery Biology, based on the work of Dr. G. A.

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Rounsefell, FAO Rpt. No. 391, 23 pp., processed, July 1955. Discusses proposed research for development of fishery resources in Turkey.

Relatorio ao Governo do Brasil sobre Biologia da Pesca (Report to the Government of Brazil on Fishery Biology), FAO Rpt. No. 494, 40 pp., illus., processed in Portuguese, May 1956. A report on Brazil's fishery resources and oceanography, illustrated by 15 charts. Includes descriptions of the most important commercial species of fish and charts their oceanic distribution by species.

Report to the Government of Sudan on a Brief Survey of the Sudanese Red Sea Fisheries (July 1955), FAO Rpt. No. 510, 41 pp., illus., processed, June 1956. Describes a brief survey of the Sudanese marine fisheries. Discusses the present status of the sea fisheries, shell fishing, and the governmental development scheme, and makes recommendations for improvement of the fisheries.

Report to the Government of Syria on the Marine Fisheries, FAO Rpt. No. 516, 39 pp., illus., processed, August 1956. This is a report based on a survey of the Syrian sea fisheries. Although the Syrian waters are rather unproductive, as is the Eastern Mediterranean in general, it appears likely that a modest increase in the production of marine fish could be obtained through implementation of the recommendations contained in this report, which aim at gradual improvement of the craft, gear, and methods used for inshore fishing, pelagic fishing, trawling, sponge diving, as well as better practices in fish handling and distribution.

Report to the Government of Egypt on the Fishery Investigations on the Nozha Hydrodrome near Alexandria, Egypt, FAO Rpt. No. 543, 21 pp., processed, September 1956. A short review of the activities on the Hydrodrome project where fishery investigations are being conducted. Contains a brief review of the project, summary of accomplishments, and recommendations concerning the Hydrodrome project.

FOOD CONSUMPTION:

Food Consumption of Households in the Northeast, Household Food Consumption Survey 1955 Report No. 2, 197 pp., processed, \$1; Food Consumption of Households in the North Central Region, Report No. 3, 197 pp., processed, \$1; Food Consumption of Households in the South, Report No. 4, 197 pp., processed, \$1; and Food Consumption of Households in the West, Report No. 5, 195 pp., processed, \$1. U. S. Department of Agriculture, Washington, D.C., December 1956. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) These reports contain portions of the data from the U. S. Department of Agriculture's nationwide survey of household food consumption made in the spring of 1955. The survey was part of the Department's broad program of research on the marketing and utilization of farm products and on family dietary levels. The basic data in this survey relate to quantities of food consumed, including fish and

shellfish. The survey was based on a national probability sample of approximately 6,000 housekeeping households of one or more persons. These reports give current information on patterns of food consumption, expenditures, dietary levels, and household food practices. Many interesting facets of the nation's eating habits are presented.

FRESH-WATER FISH:

Freshwater Fishery Biology, Second Edition, by Karl F. Lagler, 434 pp., illus., printed, \$6.75. Wm. C. Brown Company, 215 West Ninth, Dubuque, Iowa.

GENERAL:

Federal Aid in Fish and Wildlife Restoration (Annual Reports of the Dingell-Johnson and Pittman-Robertson Programs for the Fiscal Year Ending June 30, 1956), 105 pp., illus., printed. Wildlife Management Institute, Wire Bldg., Washington 5, D. C.

"Ionizing Radiations in the Processing of Plant and Animal Products," by John T. R. Nickerson, Bernard E. Proctor, and Samuel A. Goldblith, article, Food Technology, vol. 10, July 1956, pp. 305-311, printed, single copy \$1.50. The Garrard Press, 119 West Park Ave., Champaign, Ill. This article is concerned with the effect of high voltage cathode rays on the organoleptic properties of fish cakes, halibut steaks, and scallops and the prevention of irradiation-induced changes under certain processing conditions.

The Open Sea: Its Natural History; The World of Plankton, by Alister C. Hardy, 335 pp., illus., printed, \$6.50. Houghton Mifflin Co., 2 Park St., Boston 7, Mass. A nontechnical account for the general reader of the teeming world of plankton, and also a guide for the study of marine biology.

"QMC is Researching Convenience Foods," by Karl Robe, article, Food Processing, vol. 17, July 1956, pp. 21-23, illus., printed. Putman Publishing Company, 111 East Delaware Place, Chicago 11, Ill.

The Underwater World, by John Tassos, 242 pp., illus., printed, \$4.95. Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. A complete guide to diving, spearfishing, and other underwater secrets.

GREAT LAKES:

Annual Report to the Great Lakes Research Committee, 1955, by W. A. Kennedy, Section I, 76 pp., Section II, 20 pp., illus., processed. Federal-Provincial Great Lakes Fisheries Research Committee, Canada. Section I reports on lamprey control experiments and discusses the following: forecast of lake trout production in Lake Superior; biological program and check-weir operations on tributaries to Lake Superior; electrical lamprey barriers; studies on possibility that sea lamprey can spawn in lakes, specifically Lake Erie; and preliminary report on a new type of electrical barrier to sea lamprey. Section II outlines progress in constructing and maintaining barriers to

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spawning lamprey and includes 14 pages of sketches and photographs of some of the lamprey barriers.

HERRING:

Prospects for the 1956-57 Herring Fishing Season, by F. H. C. Taylor, Circular No. 43, 9 pp., illus., processed. Fisheries Research Board of Canada, Pacific Biological Station, Nanaimo, B. C., Canada, August 1956. The twelfth in an annual series of circulars dealing with the prospects of Canada's British Columbia fishery.

INDIA:

Agenda and Notes (All India Fisheries Conference, Madras, September 1956), 42 pp., printed. Government of India, Ministry of Food and Agriculture, Fisheries Division, Madras, India.

JAPAN:

Journal of the Tokyo University of Fisheries, vol. 42, no. 1, 102 pp., illus., printed. The Tokyo University of Fisheries, Shiba Kaigandori 6, Minato-ku, Tokyo, Japan, February 1956. Contains, among others, the following articles: "Determination Method of Freshness of Fish Muscle with Trimethylamine," by S. Horie and Y. Sekine; "Polarographic Studies on the Rancid Oil," by T. Kikuchi, I. Okada, I. Osakabe, and K. Fukushima; "Experiments on the Freezing of Fish by the Air-Blast Freezer," by J. Nagaoka, S. Takagi, and S. Hotani; "Refrigeration of Fish on Boats in Japan," by K. Tanaka; "Defrosting of Frozen Whale Meat," by K. Tanaka and T. Tanaka; "Biochemical Condition of Whalemeat Before or After Freezing and Cold Storage of Frozen Meat," by K. Tanaka and T. Tanaka; "Studies on the Quality Inspection of Frozen Tunny in Frozen State," by S. Hotani; and "A Coastal Survey of the Gulf of Mexico by Japanese Fishing Boats in 1936 and 1937," by H. Niino, N. Nasu, and R. H. Parker.

Journal of the Tokyo University of Fisheries, vol. 42, no. 2, 104 pp., illus., printed. The Tokyo University of Fisheries, Shiba Kaigandori 6, Minato-ku, Tokyo, Japan, March 1956. Contains, among others, the following articles: "Researches on the Fishing Grounds in Relation to the Scattering Layer of Supersonic Wave (Introductory Report)," by M. Uda; "Observations on the So-Called Deep Scattering Layer (DSL), with Special Reference to the Vertical Distribution of Plankton," by Y. Komaki and Y. Matsuye; "The Scattering Layer in Relation to Fishing," by K. Ozawa and J. Ihara; and "General Results of the Oceanographic Surveys (1952-1955) on the Fishing Grounds in Relation to the Scattering Layer," by M. Uda, N. Watanabe, and M. Ishino.

Second Fisheries Census as of January 1, 1954, Survey Result of Sea Fisheries, no. 47, 37 pp., mostly tables, printed in Japanese. Agriculture and Forestry Ministry, Tokyo, Japan. Presents statistical tables of the following: types of fishing done, types of vessels used, number of people engaged in fishing, number of fishing vessels used, and total catch by species; by individuals; by cooperative, production, and joint associations; by companies; and by government organizations. Also gives data on family income from fishery; number of families dependent on income

from sources other than fishery; fishermen's source of income from the fisheries and other employment; number of individuals, industries, and others engaged in the various fisheries; and number of fishermen by districts.

MACKEREL:

"Utilization of Food by Mackerel, *Pneumatophorus japonicus* (Houttuyn)," by Masayoshi Hatanaka and Masao Takahashi, article, *The Tohoku Journal of Agricultural Research*, vol. VII, no. 1, September 1956, pp. 51-57, illus., printed. Faculty of Agriculture, Tohoku University, Sendai, Japan.

MARINE SCIENCE:

"Marine Science in the South-East Pacific Ocean," by G. E. R. Deacon, article, *Nature*, vol. 179, no. 4550, January 12, 1957, pp. 66-68, printed. MacMillan and Co., Ltd., St. Martin's St., London, W. C. 2, England. Following its policy of arranging discussions on marine science in areas where they are likely to attract new interest, the United Nations Educational, Scientific and Cultural Organization invited its Marine Science Advisory Committee and other specialists to meetings in Lima. The Committee met for the time during October 22-24, though the ground had been prepared by an interim committee in Tokyo, and by reports on the needs of marine science from national commissions and international organizations. The Committee considered a wide range of problems and recommended direct or indirect support for work that will cultivate interest in the oceans and understanding of their behaviour, especially in countries where little attention has been paid to them. It also urged support for organizations engaged in perfecting various aspects of the science to the point where they can become really effective in practical problems. In addition to the Committee's recommendations, this article discusses the work that has been done in the past on marine science in the south-east Pacific Ocean and the many problems that still have to be solved.

MIDWATER TRAWLING:

"Some Problems in Mid-Water Trawling," by I. D. Richardson, article, *World Fishing*, vol. 6, no. 2, February 1957, pp. 28-31, illus., printed. John Trundell (Publishers) Ltd., Temple Chambers, Temple Avenue, London E.C. 4, England. Describes in detail the problems confronting users of midwater trawls and discusses suggested methods for overcoming those problems. Specifications and methods of opening a midwater trawl are shown in diagrammatical form.

NEWFOUNDLAND:

The Bonavista Longlining Experiment, 1950-1953, by Wilfred Templeman and A. M. Fleming, Bulletin No. 109, 60 pp., illus., printed, 50 Canadian cents. Queen's Printer, Ottawa, Canada, 1956. Describes longlining experiments which were carried on from 1950-1953 at Bonavista, using Cape Island-type longliners from Nova Scotia. These boats were larger than those typically used in the trap, handline and inshore line-trawl fishery on the east coast of Newfoundland. In 1950 the operations were wide-ranging and

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exploratory. In 1951, from early June to mid-December, a commercial fishing trial was carried out to compare the financial returns from a 42-foot boat with a 3-man crew, and a 51-foot boat with a 4-man crew. In 1953, two 55-foot longliners fished the offshore grounds in May. Their excellent catches demonstrated that longlining on a commercial basis could be successful throughout May and probably in April. Bonavista fishermen, stimulated by the successful fishing of the experimental longliners, began longlining either in converted boats or ones expressly built for long-line fishing. From three boats in 1951 the local fleet increased to 10 during 1952 and to 14 in 1953. Though there was considerable variation in the yearly total catch from long-line boats fishing mainly offshore, the yearly catch per unit of gear showed little variation from boat to boat, and those which fished 50 to 60 trips were financially successful. During June and July, when landings of cod from traps, handlines and linetrawls are at their peak, the proportion of the total catch attributable to longliners is small. Following this, the longliner proportion of the catch increases with advance of the season until toward the end longliners are landing the bulk of the cod. In many years long-line boats could fish the deep water profitably in May and early June, and sometimes in April, while the large inshore codfishery by other methods usually begins late in June.

Danish-Seining Explorations in Newfoundland and Cape Breton Areas, by T. N. Stewart, Bulletin No. 108, 31 pp., illus., printed, 50 Canadian cents. Queen's Printer, Ottawa, Canada, 1956. The Danish seine can be operated only on a smooth sea bottom, and in 1952 the only known fishing ground suitable for it around Newfoundland was a small area in Fortune Bay, where Danish seining for the witch flounder or grey sole began in 1951. In 1953 and 1954 a survey of the coast of Newfoundland, the southwest edge of the Grand Bank of Newfoundland, and the area to the west of Cape Breton Island was made to locate additional grounds suitable for seining. A 56-foot wooden Danish seiner was used for these explorations. No new grounds were found close to the Newfoundland coast. The southwest edge of the Grand Bank could be fished by Danish seine, but a larger vessel would be required. The rather small size of the fish and the extra work in culling might make such a fishery uneconomic at 1955 prices. Excellent catches were obtained in the Gulf of St. Lawrence in North Bay near Cape Breton Island, and it is probable that a good Danish seine fishery could be developed there under present economic conditions.

OCEANOGRAPHY:

Data Collected by Scripps Institution Vessels on Eastrop Expedition, September-December 1955, SIO Reference 56-28, 156 pp., illus., processed. Scripps Institution of Oceanography, University of California, La Jolla, Calif., October 15, 1956.

Physical and Chemical Data, CCOFI Cruise 5205 (MLR 37), May 9-28, 1952, SIO Reference 56-24, 78 pp., illus., processed. Scripps Institution of Oceanography, University of California, La Jolla, Calif., August 17, 1956.

OHIO:

Summary of the Ohio Lake Erie Commercial Fish Catch, 1885-1955, no. 281-F, 60 pp., illus., processed. Division of Wildlife, Ohio Department of Natural Resources, 1500 Dublin Rd., Columbus 12, Ohio, 1956. A summary of available statistical information pertaining to the Ohio commercial fishery of Lake Erie dating from the first record in 1885 through the 1955 season. Catch statistics for 1954 are shown by species, seasons, months, gear, districts, counties, and major ports. Data on the trap-net catch, percent of total catch (all gear), and average pounds per lift are given for 1948-55. Total production of Ohio Lake Erie commercial fisheries is shown for 1935-55.

Summary of the Ohio Lake Erie Commercial Fisheries 1955, 18 pp., processed. Division of Wildlife, Ohio Department of Natural Resources, 1500 Dublin Rd., Columbus 12, Ohio. A statistical summary, compiled by the Department's Wildlife District One, Sandusky, pertaining to the Ohio commercial fisheries of Lake Erie for 1955. Catch statistics are shown by species, seasons, months, gear, districts, counties, and major ports. Data on the trap-net catch, percent of total catch (all gear), and average pounds per lift are given for 1955.

OREGON:

Biennial Report of the Fish Commission of the State of Oregon to the Governor and the Forty-Ninth Legislative Assembly, 1957, 28 pp., printed. Fish Commission of the State of Oregon, 307 State Office Bldg., Portland 1, Ore. A report of the operation of the Commission together with a financial statement for the biennial period July 1, 1954 to June 30, 1956. During this period, according to the report, the fisheries management and conservation program has reflected the rapid increase in the number of hydroelectric and water development projects within the State. These have imposed unprecedented demands for studies which will provide the basis for measures which will protect the fisheries values as they are affected by an expanding economy. This report includes a condensed resume of the work which has been carried on by the Division of Engineering, Division of Fish Culture, and Research Division of the Commission during the period under review. It also shows the pack of canned salmon on the Columbia River during the years 1928-1955.

Preliminary Report on Stream Surveys and Fish Relocation Feasibility Studies Made Necessary by the Construction of Mt. Sheep and Pleasant Valley Dams, 91 pp., illus., printed. Oregon Game Commission, Portland, Ore., 1956.

PORTUGAL:

IV Congresso Nacional de Pesca (Fourth National Fishery Congress), no. 28, 313 pp., illus., printed on Portuguese. Gabinete de Estudos das Pescas, Lisbon, Portugal, 1955. Gives brief summaries and conclusions derived from each of 108 reports presented to the Fourth National Fishery Congress held in Lisbon June 20 through 30, 1955.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

QUALITY:

Volatile Bases and Sensory Quality-Factors in Iced White Fish, by A. S. C. Ehrenberg and J. M. Shewan, DSIR Food Investigation Memoir No. 928, 11 pp., illus., printed. (Reprinted from *Journal of the Science of Food and Agriculture*, vol. 6, no. 4, 1955, pp. 207-217.) Department of Scientific and Industrial Research, London, England.

REFRIGERATION:

The Expressible Fluid of Fish Fillets: II. --Method of Determination, by A. Banks, 5 pp., illus., printed. (Reprinted from *Journal of the Science of Food and Agriculture*, vol. 6, no. 5, 1955, pp. 282-286.) Department of Scientific and Industrial Research, Torry Research Station, Aberdeen, Scotland. Describes a method for measurement of expressible fluid in whole fish fillets during cold storage.

Frozen Food Lockers--Highlights of a Survey, by P. C. Wilkins, L. B. Mann, and B. D. Miner, FCS Circular 17, 21 pp., illus., printed. Farmer Cooperative Service, U. S. Department of Agriculture, Washington 25, D. C., June 1956. This report is designed to provide a broad view of the frozen food locker industry. It describes the industry in terms of location, size, services, rates, patronage, and volume. The information was assembled from reports received from 6,390 locker operators and covers 1954 operations. Comparisons were made with information secured in earlier surveys, particularly surveys made in 1950 and 1946. To compare figures in this report with previous surveys, this publication shows the number and types of plants and patrons, number of lockers, and rates charged on January 1, 1955. Business volume figures for the plants cover the year 1954. The authors state that, "For the past 5 years and to some degree since the close of World War II, this industry has been adjusting its operations to take advantage of opportunities arising from the increasing use of home freezers. It has also been processing more locally-produced foods for sale, thereby improving operating efficiency. Thus the industry can compete more successfully with other segments in the food processing field. Indications are that future expansion in the frozen food locker industry will be in the field of processing and merchandising. While renting lockers will continue as an important phase of the business, revenue from this service will probably decline in relative importance."

SALMON:

Salmon Stock Fluctuations in the Baltic Sea, by Gunnar Svardson, article, *Annual Report for the Year 1954 and Short Papers*, no. 36, pp. 225-262, printed. Institute of Freshwater Research, Fishery Board of Sweden, Stockholm, Sweden, 1955.

SALT FISH:

The Browning of Salt Cured White Fish, by J. M. Shewan, DSIR Food Investigation Memoir No. 927, 4 pp., illus., printed. (Reprinted from *Food Manufacture*, May 1955.) Torry Research Station, Food Investigation Organization, Department of Scientific and Industrial Research, London, England, 1955.

"Quemado" de las Salazones Secas de Pescado ("Sunburn" of Dried Salted Fish), by Dr. Victor H.

Bertullo, Dr. Hugo Ferrando, and Emilio La Mata, 8 pp., illus., printed in Spanish with a brief summary in English. (Reprinted from *Anales de la Facultad de Veterinaria del Uruguay*, vol. VI, no. 3.) Contralor Sanitario del Servicio Oceanografico y de Pesca, Montevideo, Uruguay.

SPORENDONEMA EPIZOUM (Corda) Cif. y Red., Agente Productor de las "Pecas" o "Mosqueado" en el Pescado Salado, Seco (Sporendonema epizoum (Corda) Cif. and Red., the Cause of "Spots" on Dried Salted Fish), by Victor H. Bertullo, 7 pp., illus., printed in Spanish with a brief summary and bibliography in English. (Reprinted from *Anales de la Facultad de Veterinaria del Uruguay*, vol. VI, no. 3.) Contralor Sanitario del Servicio Oceanografico y de Pesca, Montevideo, Uruguay.

SAURY:

Spawning Ground of the Saury, *Cololabis saira* (Breboort), in the Japan Sea, Masayoshi Hatanaka and Kiyonari Sekino, article, *The Tohoku Journal of Agricultural Research*, vol. VII, no. 1, September 1956, pp. 59-64, illus., printed. Faculty of Agriculture, Tohoku University, Sendai, Japan.

SCALLOPS:

Scallops (PECTEN MAXIMUS L.) in Irish Waters, by F. A. Gibson, 20 pp., illus., printed, 5s. (70 U. S. cents). (Reprinted from *The Scientific Proceedings of the Royal Dublin Society*, vol. 27, no. 8, October 12, 1956, pp. 253-271.) The Royal Dublin Society, Ball's Bridge, Dublin, Ireland, 1956.

SHAD:

"The Migratory Shad", by Bernard L. Gordon, article, *The Fisherman*, vol. VIII, no. 2, February 1957, pp. 14-16, 80, illus., printed, single copy 50 cents. Fisherman Press Inc., Oxford, Ohio. Describes the early colonial shad fishery on the Connecticut River. Also discusses the methods developed for transporting shad over the dam of the Holyoke (Massachusetts) Power Company and spawning and feeding habits and migratory routes of shad. Three photographs of the unique shad elevator at the Hadley Falls, Mass., dam are also included.

SHELLFISH CULTURE:

"On Utilization of Salt Water Ponds for Shellfish Culture", by Victor L. Loosanoff, article, *Ecology*, vol. 37, no. 3, July 1956, pp. 614-616, printed, single copy \$2. Circulation Office, Duke University Press, Box 6697, College Station, Durham, N. C. Considerable interest has been displayed in the possibilities of cultivating the American oyster, *Crassostrea virginica*, and other molluscs in small, enclosed or semi-enclosed salt-water bodies, such as the numerous ponds that are found along the shoreline of a mainland and also on some large islands, such as Gardiners Island, New York; Martha's Vineyard, Mass.; and others. This interest is shown because the oyster beds in such large areas as Long Island Sound are severely damaged by frequent hurricanes and storms, and because the efficient control of oyster enemies there is extremely difficult. These disadvantages, however,

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can be eliminated if oysters are grown in relatively small bodies of water that are well protected against the action of storms, and where the control of oyster enemies is more feasible. This article proposes the approaches for ascertaining the suitability of small, enclosed or semi-enclosed salt-water bodies for the propagation of oysters and other molluscs. It suggests the steps to be taken in studying the physiological, chemical, and biological characteristics of such ponds, and recommends certain devices and methods that should improve their conditions.

SMELT:

"Studies on Columbia River Smelt, *Thaleichthys pacificus* (Richardson)," by Wendell E. Smith and Robert W. Saalfeld, article, *Fisheries Research Papers*, vol. 1, no. 3, February 1955, pp. 3-26, printed, Department of Fisheries, Fishermen's Terminal, Salmon Bay, 4015 20th Ave., West, Seattle 99, Wash.

SOUTH CAROLINA:

(Bears Bluff Laboratories) *Annual Report 1955-1956*, Contribution No. 24, 19 pp., illus., printed. (Reprinted from *Report of South Carolina Wildlife Resources Department, Fiscal Year July 1, 1955-June 30, 1956*.) Bears Bluff Laboratories, Wadmalaw Island, S. C., January 1957. The activities of the Laboratories are described. Research was conducted on oysters, shrimp, crabs, finfish, and salt-water ponds.

SPAIN:

La Pêche a Bermeo--Espagne (Fishery in Bermeo, Spain), by F. Doumenge, 19 pp., illus., printed in French. (Reprinted from *Vie et Milieu*, vol. VII, no. 3, 1956, pp. 307-325.) Centre Regional de la Productivité et des Etudes Economiques, Rue de Verdun 22, Montpellier, France. Discusses the economic importance of fishery at the port of Bermeo on the North Atlantic coast of Spain.

Sobre el fomento de la producción pesquera de las aguas marinas y salobres confinadas; en el litoral de España y en el de sus Territorios de Soberanía y de Protectorado (Concerning the Improvement of Fishery Production in Marine Waters and Confined Salt Waters of the Shores of Spain and Its Possessions and Protectorates), by Luis Lozano Rey, *Boletín del Instituto Español de Oceanografía*, no. 74, 83 pp., illus., printed in Spanish. Instituto Español de Oceanografía, Ministerio de Marina, Madrid, Spain, January 10, 1956. Presents a brief history of salt-water fisheries in Spain and Spain's possessions and protectorates. Discusses the possibilities of increasing fishery production by: intensifying the catch of fish that prey on other fish of commercial value; improving fishing methods and technology; augmenting research in fish species, fishery banks, and fishing industry, especially canning; cultivating and transplanting fish from other waters; and expanding fishery legislation. Also includes brief reports of the principal species of fish produced in specific regions of Spain and in the Balearic Islands, Morocco, Ifni, Spanish Sahara, and Spanish Guinea.

SPOILAGE:

"Spoilage of Fish in the Vessels at Sea: 5. Bilgy Fish," by Norma L. McLean and C. H. Castell,

article, *Journal of the Fisheries Research Board of Canada*, vol. 13, no. 6, November 1956, pp. 861-868, illus., printed, Queen's Printer, Ottawa, Canada. A study of spoilage of fish in vessels at sea shows that offensive "bilgy" odors develop when fish are stored in contact with slime-soaked wooden surfaces. Anaerobic bacteria develop in the slime layer between the surfaces of the fish and the wood. The muscle of bilgy fish has a higher hydrogen sulphide and a lower mercaptan content than that of similar fish spoiling in ice but not in contact with wood. The trimethylamine and volatile acid values are usually, but not consistently, high in bilgy fish. In these experiments the bilgy odor became evident in the muscle of fish jammed up against heavily contaminated wood surfaces only when the hydrogen sulphide content reached approximately 0.05 mg. per 100 g. of fish.

TERRITORIAL WATERS:

"Comments by Certain Governments on the Provisional Articles Concerning the Regime of the High Seas and the Draft Articles on the Regime of the Territorial Sea Adopted by the United Nations International Law Commission at Its Seventh Session in 1955," article, *The American Journal of International Law*, vol. 50, no. 4, October 1956, pp. 992-1049, printed, single copy \$2.50. The American Society of International Law, 1826 Jefferson Place, NW., Washington 6, D. C. Presents the comments of six governments--Sweden, Israel, United Kingdom, United States, Cambodia, and Iceland--on the texts of draft articles concerning the regime of the high seas, the regime of the territorial sea, and conservation of living resources of the sea. Comments from member nations were requested by the United Nations International Law Commission to help prepare the final report on the law of the sea at the Commission's eighth session.

"Continental Shelf and International Law: Confusion and Abuse," by Josef L. Kunz, article, *The American Journal of International Law*, vol. 50, no. 4, October 1956, pp. 828-853, printed, single copy \$2.50. The American Society of International Law, 1826 Jefferson Place, NW., Washington 6, D. C. Discusses the great controversy of the doctrine of the continental shelf and its infringement upon the freedom of the high seas. Location of petroleum beneath the waters of the continental shelf has caused coastal nations to secure sovereignty over those waters. According to the author, such sovereignty should cover only petroleum and mineral rights but confusion of existing laws has arisen and the coastal states have also claimed sovereignty over fisheries, navigation, and other rights included in freedom of the high seas. The article stresses the need to strike a just balance between the legitimate interests of the coastal state and the high seas requirements of the international community.

(International Law Commission) *Report of the International Law Commission on the Work of Its Eighth Session: (a) Final Report on the Regime of the High Seas, the Regime of the Territorial Sea and Related Problems*, A/C.6/L.387, November 28, 1956, 8 pp., processed. United Nations, International Law Commission, New York, N. Y.

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"Pan American Discussions on Offshore Claims," by Richard Young, editorial, The American Journal of International Law, vol. 50, no. 4, October 1956, pp. 909-916, printed, single copy \$2.50. The American Society of International Law, 1826 Jefferson Place, NW., Washington 6, D. C. Briefly relates the evolution of the concept of the continental shelf from its origin in the United States Proclamation of September 28, 1945, to the present. Discusses the outcome of several inter-American conferences, especially the Ciudad Trujillo Conference of March 1956 held expressly for the purpose of solving some of the existing problems caused by over-extension of the doctrine of the continental shelf.

"United Nations Report of the International Law Commission Covering the Work of Its Eighth Session, April 23-July 4, 1956," article, The American Journal of International Law, vol. 51, no. 1, January 1957, pp. 154-256, printed, single copy \$2.50. The American Society of International Law, 1826 Jefferson Place, NW., Washington 6, D. C. A report in four chapters. Chapter I covers the organization of the Commission's eighth session. Chapter II describes the accomplishments of the Commission, during past sessions, in regard to questions of high seas and the territorial sea; presents the text of the articles concerning the law of the sea; and includes a full commentary by the Commission on each of the articles of the law of the sea. Chapter III briefly covers progress on other subjects under study. Chapter IV reports on other decisions of the Commission.

TILAPIA:

The Breeding Behaviour of TILAPIA Species (Pisces: Cichlidae) in Natural Waters: Observations on T. KAROMO Poll and T. VARIABILIS Boulenger, by R. H. Lowe (McConnell), 24 pp., illus., printed. (Reprinted from Behaviour, vol. IX, 2-3.) East African Fisheries Research Organization, Jinja, Uganda, 1956.

Observations on the Biology of Tilapia (Pisces: Cichlidae) in Lake Victoria, East Africa, by Rosemary H. Lowe (McConnell), Supplementary Publication No. 1, 79 pp., illus., printed. East African Fisheries Research Organization, P.O. Box 343, Jinja, Uganda, 1956.

TRADE LIST:

The Office of Intelligence and Services, Bureau of Foreign Commerce, U. S. Department of Commerce, Washington 25, D. C., has published the following mimeographed trade list. Copies of this list may be obtained by firms in the United States from that office or from Department of Commerce field offices at \$2 each.

Oils (Animal, Fish and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters -- Portugal, 14 pp. (January 1957). Contains the names and addresses, size of firm, and type of product handled by each firm. The report is divided into four parts and includes the following: Part 1(c) - Producers of Fish and Animal Oils; Part 2(b) - Refiners of Cod Liver Oil; and Part 4 - Exporters of Fish and Animal Oils. Exports

of marine animal oils totaled 8,376 metric tons in 1955. The United States imported about 27 percent of the 1,943 tons of cod liver oil exported from Portugal in 1955

TUNA:

"Observation of Schooling Juvenile Tuna, Euthynnus alleteratus, in the Gulf of Mexico," by Harvey R. Bullis, Jr., article, Copeia, no. 2, May 20, 1955, pp. 153, printed, single copy \$2.00. American Society of Ichthyologists and Herpetologists, Mt. Royal and Guilford Aves., Baltimore, Md.

TURKEY:

"On the Turkish Fishing Boats," by H. I. Chapelle and M. N. Ozerdem, article, Balık ve Balıkçılık (Fish and Fishery), vol. V, no. 1, January 1957, pp. 14-18, illus., printed in Turkish. Et ve Balık Kurumu, Istanbul, Turkey. A feature article giving the details of the Turkish type of fishing boats.

Some Observations on the Hydrography and Occurrence of Fish off the Turkish Black Sea Coast, October 11-November 1, 1954, by Olav Aasen and İlham Artuz, Marine Research Series Report No. 1, 23 pp., illus., printed. Fishery Research Center of the Meat and Fish Office, Istanbul, Turkey, 1956.

URUGUAY:

Neoplasma de los Peces de las Costas Uruguayas (Neoplasms of Fish from Uruguayan Shores), by Victor H. Bertullo and Roberto M. Traibel, 5 pp., illus., printed in Spanish with a brief summary in English. (Reprinted from Anales de la Facultad de Veterinaria del Uruguay, vol. VI, no. 3.) Contralor Sanitario del Servicio Oceanografico y de Pesca, Montevideo, Uruguay.

VESSELS:

Analysis of the Fishing Operations of Small and Medium-Sized Modern Long-Liners and Drifters in the Atlantic Provinces, 1955, by John Proskie, Production Studies, vol. 5, Part 1, 47 pp., processed. Department of Fisheries of Canada, Markets and Economics Service, Ottawa, Canada, August 1956. A report, including many tables, of a 1955 study of performance of fishing boats of various sizes, gear and operational methods, capital cost, and problems of financing and related topics.

WHALES:

"Whale Off!" (The Story of American Shore Whaling), by Everett J. Edwards and Jeannette Edwards Rattray, 308 pp., illus., printed. Coward-McCann, Inc., New York, N. Y., 1956. A very interesting and well-written book on American shore whaling in general, and the small-boat whaling carried on off the eastern end of Long Island from 1640 to 1918, in particular--the first and last whaling of this sort done anywhere in America. It describes not only the thrills of the whale chase, but the everyday work and play of these shore-whalemen who were farmers and fishermen in the intervals between whales.



CONTENTS (CONTINUED)

	Page		Page
FOREIGN (Contd.):		FOREIGN (Contd.):	
Canada (Contd.):		Sweden:	
Midwater Trawl Improved	43	New Regulations for Baltic Fishing	55
Northwest Atlantic Trawl Net Mesh Regulations ..	44	Thailand:	
Use of Aureomycin for Fish Preservation Held Up ..	44	Joint Thailand-Japanese Fishing Base Proposed ..	56
China (Communist):		Turkey:	
Fisheries Production, 1956	44	Canned Mackerel Market	56
Colombia:		U. S. S. R.:	
Canned Mackerel Market	45	A Mechanical Method of Dressing Cod Aboard ..	56
Ecuador:		Fishing Vessels	56
Shrimp Fishing and Processing Industry	45	United Kingdom:	
France:		Silver Cod Award Made For 1956	58
Fishing Industry Developments	46	Yugoslavia:	
French West Africa:		Canned Mackerel and Pilchard Market	58
Tuna Fishing Industry	46	FEDERAL ACTIONS:	60
Iceland:		Department of the Interior:	
Fisheries Trends, December 1956	47	U. S. Fish and Wildlife Service:	
Italy:		Alaska's Commercial Fishing Regulations for 1957 ..	60
Canned Tuna Imports, 1954-55	48	Department of Health, Education, and Welfare:	
Japan:		Food and Drug Administration:	
British Whaling Fleet Purchase Disapproved ...	49	Order on Canned Tuna Identity and Fill-of-Container ..	61
Canned Crab Meat Pack, 1956	49	Standard Issued	61
Exports of Fishery Products Up in 1956	50	Eighty-Fifth Congress (First Session)	65
Mexico:		FISHERY INDICATORS:	68
Canned Sardine Market	50	Chart 1 - Fishery Landings for Selected States ...	68
Shrimp Fishery Trends, February 1957	51	Chart 2 - Landings for Selected Fisheries	69
Norway:		Chart 3 - Cold-Storage Holdings and Freezings of ..	70
1957 Winter Herring Season A Failure	51	Fishery Products	70
Pakistan:		Chart 4 - Receipts and Cold-Storage Holdings of ..	71
Nylon Nets Help Fishermen	52	Fishery Products at Principal Distribution Centers ..	71
Portugal:		Chart 5 - Fish Meal and Oil Production - U. S. and ..	71
Canned Fish Trends, June-December 1956	52	Alaska	71
Canned Fish Exports, January-September 1956 ..	53	Chart 6 - Canned Packs of Selected Fishery Products ..	72
Canned Fish Pack, January-September 1956	53	Chart 7 - U. S. Fishery Products Imports	73
Fisheries Trends, August-September 1956	54	RECENT FISHERY PUBLICATIONS:	74
Spain:		Fish and Wildlife Service Publications	74
Vigo Fisheries Trends, November 1956	54	Miscellaneous Publications	76



Editorial Assistant--Ruth V. Keefe

Illustrator--Gustaf T. Sundstrom

Compositors--Jean Zalevsky, Alma Greene, Helen Joswick, and Helen Turner

Photograph Credits: Page by page, the following list gives the source or photographer for each photograph in this issue. Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

Front and outside back cover--Elliott A. Macklow; pp. 20, 21, 22, and 23--F. Bruce Sanford; p. 25--Ray C. Erickson.

FISHERY MOTION PICTURE

The following motion picture is available only from the source given in the listing.

Fresh Out of the Water, a 16 mm. 14-minute sound and color film produced and distributed by the U. S. Fish and Wildlife Service, highlights the fact that it is the dietitians, diet specialists, and the consuming public who "call the turn" on the fishing industry; that popular demand, competition with other protein foods, modern machinery, and processing, have resulted in fishery products which are truly "fresh out of the water" despite time and distance from lake and sea.

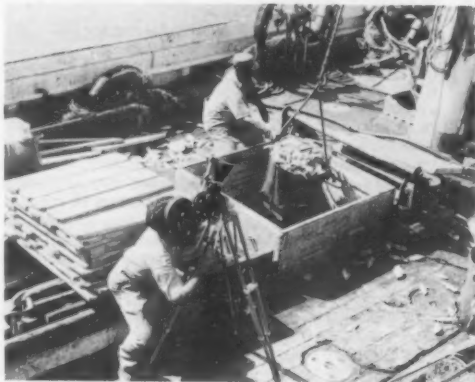


Fig. 1 - Cameraman filming the unloading of ocean perch at Gloucester, Mass.

Beginning with an underwater sequence, the film first shows the catching of fish, emphasizing the cleanliness of the fishing boats and the extreme care which is given fish from the moment of taking. The film then moves into a brief but comprehensive picture of what takes place before fish reach the consumer--the icing, freezing, filleting, canning, and other processing, the transporting and the marketing. Then it shows two steps so important after the product is in the consumers' hands--the proper preparation of the food and, finally, serving it in an attractive manner.



Fig. 2 - U. S. Department of Agriculture Inspector grading fish sticks at Gloucester, Mass.

The film was produced with funds provided by the Saltonstall-Kennedy Act of 1954. Copies of the film are available at 140 film libraries which distribute fishery films produced by the Bureau of Commercial Fisheries of the U. S. Fish and Wildlife Service. Further information relative to the picture may be obtained from the U. S. Fish and Wildlife Service, Washington 25, D. C.

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